

# FLIGHT

The  
AIRCRAFT  
ENGINEER  
&  
AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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## Flight

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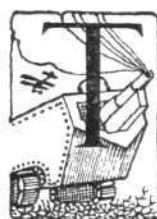
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## EDITORIAL COMMENT.



THIS issue of FLIGHT represents a radical departure from our usual practice, inasmuch as it contains, to all intents and purposes, but one subject, albeit a very large one: The British Aircraft Industry. Large, that is to say, when it comes to condensing reference to it into a single issue, although not a tithe of what it should be, and falling very dangerously short of the size it ought to be for national safety. Nevertheless, we are convinced that the British Aircraft Industry need fear no comparison with that of any other country, and if financial conditions are such that it is not possible for British constructors in large numbers to exhibit at the Paris Aero Show, this is not the fault of the Industry but is due to the scant encouragement given by our Government to British aviation firms.

Other countries, and notably France, have realised that there is an enormous future before aviation in all its branches, and huge sums are being devoted to the development of air lines, to the production of new types of machines, and to propaganda abroad. Thus, in the past, when a few British firms have had the enterprise to send representatives abroad, these have usually found that other and more far-seeing nations have got in ahead of us, and have reaped a large share of the orders that might otherwise have been placed with British firms. Partly this has been due to the rate of exchange, which has generally been against us and in favour of countries like France and Italy, but to a large extent the cause may also be ascribed to the support which these countries have given their aviation firms in the matter of sending out missions, of granting subsidies for propaganda, or else, indirectly, by placing orders at home which have enabled the firms themselves to defray the expenses involved in propaganda work of this nature.

In spite of all these drawbacks, however, British aircraft are still to be seen all over the world, giving yeoman service to the purchasers and maintaining British prestige abroad, and we think that most unbiassed observers will admit that, as regards quality, British aircraft products have nothing to fear from comparison with those of other nations.

### DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.

Dec. 15 .... Lecture, "Experimental Data without Wind Channel," by O. T. Gnosspeilus, before I.Ae.E.

Dec. 15-

Jan. 2 .... Paris Aero Exhibition

1923.

Jan. 3 .... F.A.I. Paris Conference

Jan. 12 .... Lecture, "Seaplane for Commercial Duties," by Maj. D. C. M. Hume, before I.Ae.E.

Jan. 26 .... Lecture, "Wind Tunnel Work at the N.P.L.," by W. L. Cowley, before I.Ae.E.

Feb. 6-7 .... Third Air Conference at the Guildhall

Feb. 9 .... Lecture, "Seaplane Design," by W. O. Manning, before I.Ae.E.

Feb. 23 .... Lecture, "Aerofoils," by Dr. A. P. Thurston, before I.Ae.E.

Mar. 15 .... Entries close for Dutch Height Indicator Competition.

Apr. 12 .... Lecture, "Some Controversial Points in Aircraft Design," by F. T. Hill, before I.Ae.E.

May 11 .... Lecture, "Experimental Flying," by Maj. M. E. A. Wright, before I.Ae.E.

June .... International Air Congress, London

Dec. 1 .... Entries close for French Aero Engine Competition.

That being so, it is unfortunate that the Paris Aero Show will not find British aircraft and engines represented nearly so well as they deserve to be. There is little doubt that, apart from the multitudes who visit the Paris Show merely as representatives of the "man in the street," and in regard to whom the exhibition is mainly of value as a piece of very effective propaganda, representatives of most civilised nations will visit the Grand Palais, there to study the latest developments in aircraft and aero-engine design.

While it is probably a fact that the latest designs, at any rate those of a military nature, rarely are allowed to be exhibited at the Salon, and thus, from the point of view of Government representatives, an aero show offers less of interest than might be supposed, there still remains the civil aviation side, and developments in detail construction, which can be, and usually are, shown at the Grand Palais.

In order that the British Aircraft Industry should not be entirely forgotten in the general interest of the Paris Show, we have compiled in the present issue brief references to all the main firms still actively engaged upon the design and construction of aircraft, aero engines, and equipment and accessories. As there would in any case have been comparatively few novelties to record, either among complete aircraft, engines, or accessories, we have thought that an issue such as the present might be made more generally interesting by giving a brief historical sketch of the past and present activities of the various firms, instead of long technical descriptions which would, in most cases, already have been published from time to time in our ordinary issues.

Thus, this week's FLIGHT contains what is hoped to be a very complete work of reference to the British Aircraft Industry as it exists today, outlining the past history—necessarily very briefly—of each firm, indicating the kind of work which has been done in the past, and mentioning, in so far as Air Ministry regulations allow, the types now being produced or about to be produced by the various designing and construction firms.

In order to facilitate reference, the articles have been subdivided under three main heads or sections, the first of which deals with British aircraft designing and construction firms, the second with British aero engine firms, and the third with firms manufacturing or selling equipment and accessories.

In each section the firms have been arranged in alphabetical order, so that it should be an easy matter

to refer to any firm under any section. In cases where one firm manufactures both aircraft and aero engines, we have dealt with the aircraft under one section and with the engines under the other, as in this manner all machines are kept together and all engines together.

It has been suggested that we should publish this issue of FLIGHT in two or three languages. After considering the matter most carefully we have decided not to do so for several reasons. To begin with, it is a matter of the very greatest difficulty to get technical articles translated really well, and the representatives of foreign governments to whom FLIGHT goes every week all, or practically all, read English as easily as they do their own language. Consequently they will have no difficulty in extracting from this issue any information required. Another point is that, were we to publish the reading matter in, for example, three languages, this would mean that we should only be able to devote one-third as much space to each firm, and we think it will be agreed, after reading the present number, that any such reduction could not be made without seriously detracting from the value of the issue.

Yet another reason for not publishing FLIGHT in several languages is that, as illustrations always have much greater appeal than columns of solid matter, we have included a very large proportion of photographs of machines and engines, publication of which will, in most instances, be sufficient reminder, to those who follow aviation matters at all closely, of the different types, full particulars of which have, in nearly all cases, already been published in previous issues of FLIGHT.

Our aim in compiling the following *résumé* of the British Aircraft Industry of today, has been to produce, as completely as possible within the space at our disposal, an index to which reference can constantly and easily be made, during the coming year, by anyone wishing to familiarise himself with the history and work of any one of our aviation firms, and we hope to have succeeded in producing a reference work the utility of which will not be confined to the week of its publication, but apply equally during the months to come. So far as we are aware, this is the first occasion upon which a weekly aviation journal has attempted to encompass within one issue a *résumé* of the entire aviation industry of the country, and the advantage of having all this information in one volume instead of spread over two or three should be very considerable.

## FLIGHT

AT THE

### PARIS AERO SALON.

**FLIGHT Stand is at the Exhibit of M. Branger, where FLIGHT can be obtained, and where all communications, Editorial or Advertisement, can be addressed.**

**London Address: 36, GREAT QUEEN STREET, KINGSWAY.**

## AIRCRAFT INDUSTRY AT A GLANCE

In the following notes we give a very brief outline of the past history and present activity of the chief British firms at present actively engaged upon the design and construction of aircraft, aero engines, equipment, etc. In order to facilitate reference, we have subdivided the article into three distinct groups, the first of which deals with aircraft firms, the second with aero engine firms, and the third with firms manufacturing equipment, components, and accessories. The firms have been arranged alphabetically in each group, so that any firm may be found with a minimum of trouble. In the case of firms who design and manufacture engines, as well as complete aircraft, we have arranged their products under the respective headings, as in this manner it will be found easier to refer to any section for information upon any particular subject.—Ed.



Aerial View of the A.D.C. Depot at Waddon (Croydon).

FOUNDED a few months after the Armistice, the Aircraft Disposal Co., Ltd., commenced its activities by taking over from the Government the enormous stocks of aircraft, aero engines, and equipment which were in existence at the termination of hostilities. A system of storage at the Waddon dépôt was adopted which would ensure not only that all material was kept in sound condition, but also that any fuselage, pair of wings, engine, etc., could be got out at any time should it be desired to re-condition a machine at short notice. Expert workmen were engaged who set to work to overhaul machines and engines, and any part found to be defective or which failed to come up to A.I.D. standards was scrapped and a new part substituted. In this manner a number of different types of machines and engines were re-conditioned, and between the taking over by the firm of the Government surplus stock and the present day close upon 1,000 machines and a corresponding number of engines have been supplied by the A.D.C. to foreign governments. Incidentally it may be mentioned that there are very few civilised nations which have not purchased British machines from this firm, and thus the British aircraft industry has been represented practically all over the world, and its reputation for "the Goods" kept to the fore.

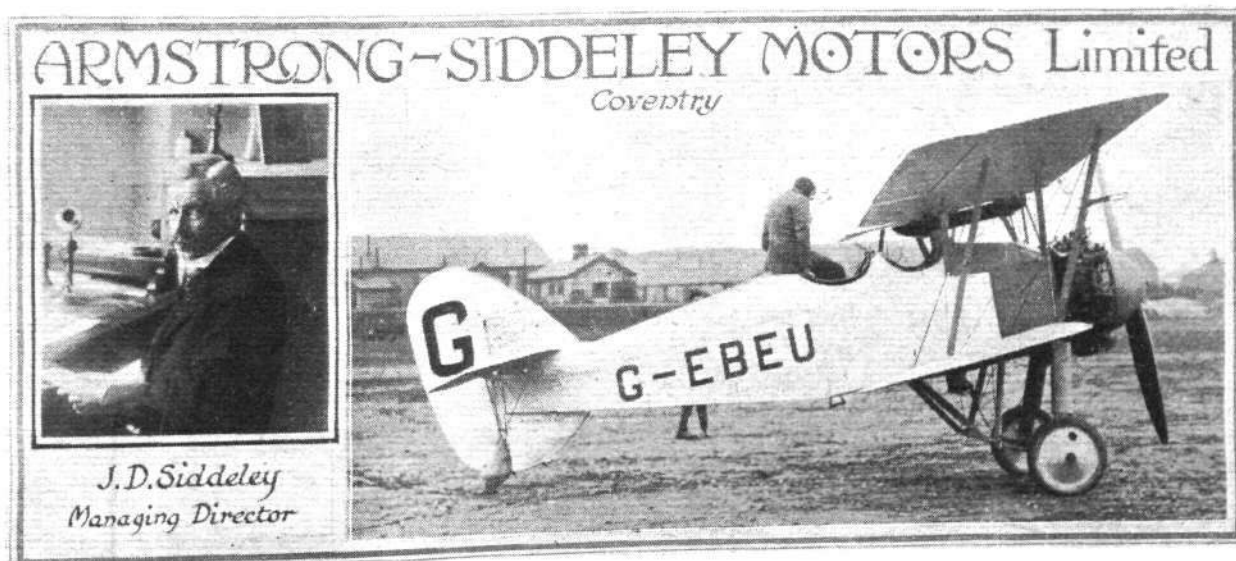
Colonel M. O. Darby, who is managing director of the

A.D.C., has thus worked up excellent connections in a great number of foreign countries, and it has now been decided that in the future the Aircraft Disposal Co. is to do original designing and construction.

At first it is the intention to design machines—of military type—which are slightly better as regards performance, etc., than those which the firm has hitherto supplied, so that countries which require slightly more up-to-date types will be able to obtain them from the original suppliers. We understand that it is not intended to compete in the home market, but merely to study the requirements of foreign Governments.

In addition to the establishment of a designing staff and construction works, the A.D.C. will act as general aeronautical agents, and already this firm has been appointed selling agents for firms such as Armstrong-Whitworth, De Havilland Aircraft Co., the Blackburn Aeroplane and Motor Co., Handley Page, Ltd., Bywater Petrol Systems, Munro Cameras, Titanine Dope, Triplex Glass, etc.

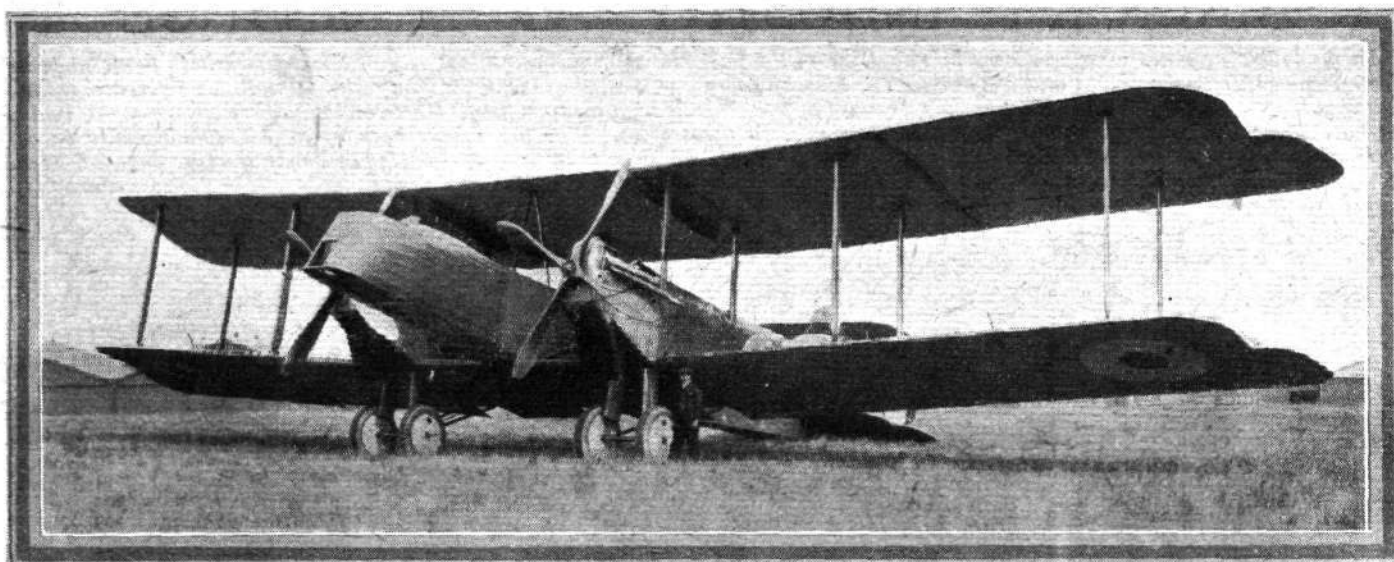
The A.D.C. will also continue as hitherto to supply aircraft, engines and equipment from stock, so that purchasers will always be certain of being able to obtain at the shortest possible notice spares, replacements, etc., for any type of aircraft or engine.



The Siddeley "Siskin," with Siddeley "Jaguar" engine.

Well known in the automobile industry long before the war, it was not until towards the end of the war that Armstrong-Siddeley Motors, Ltd., of Coventry (or Siddeley-Deasy, as the firm was then styled) established an aircraft

department. The firm had, however, quite early in the war entered the aircraft industry by turning out the now famous Siddeley "Puma" aero engine. Of this side of the firm's activities, more will be said in the aero engine section.




The Siddeley "Sinaia," with two Siddeley "Tiger" engines.

Probably the first Siddeley aeroplane to be heard of by the outside world was the "Siskin," an early edition of which was fitted with an A.B.C. "Dragonfly" engine. This machine was designed as a single-seater fighter, and one of its characteristic features was the Oleo undercarriage. Since that time Major F. M. Green, who is in charge of the aircraft department, has re-designed the machine, and the modern "Siskin," which is fitted with one of the new Siddeley "Jaguar" radial air-cooled engines, differs considerably from the original model.

Another machine produced by this firm was the "Sinaia," a twin-engined military machine fitted with two Siddeley

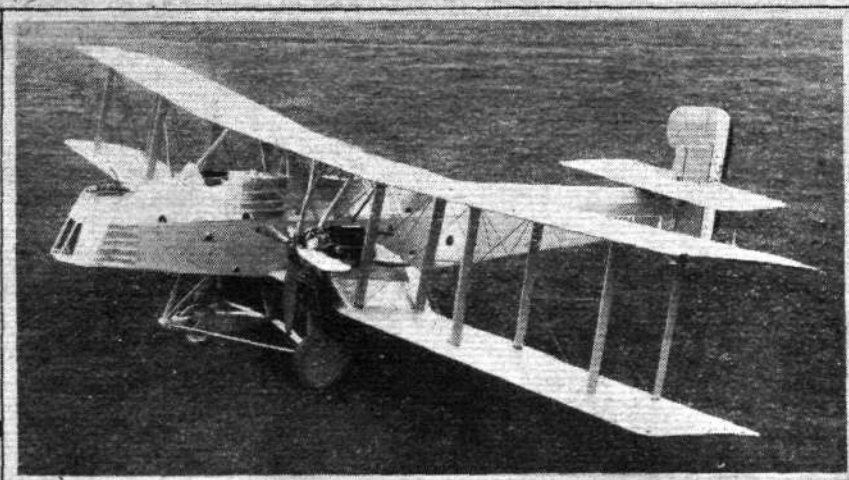
"Tiger" engines. The accompanying photograph shows the "Sinaia," but as the machine is the property of the Air Ministry, no details may be given.

The same remark applies to a great extent to a very great deal of the experimental work now being carried out by Armstrong-Siddeley Motors. Regarding this little may be said, beyond stating that work on metal construction is being carried out in the experimental shops, and that some very interesting researches into this form of construction give good promise. Major F. M. Green is a firm believer in metal for aircraft, and this side of the firm's activities will be watched with interest.



*J.D. North*  
*Chief Engineer & Designer*

**BOULTON & PAUL Ltd.**  
*Norwich*



The Boulton and Paul "Bolton" all-metal aeroplane, two Napier "Lion" engines.

Boulton and Paul, Ltd., of Norwich, is a very old firm of general engineers, and when, during the war, they first commenced to build aircraft, they started with one F.E.2B. Others followed, and before many months the aircraft department of Boulton and Paul had assumed large proportions. Other types of machines were built, notably a very great number of Sopwiths, and ultimately almost the whole of the extensive works in Norwich, as well as the new works built at Mousehold, were busy turning out aircraft.

The directors of Boulton and Paul's, of whom there are several Fiskes and Pauls, as they familiarised themselves with aircraft and aircraft construction, became convinced that there was a great future before aviation in its various branches, and they decided that the time had come for getting out original machines instead of building to other people's

designs. Consequently Mr. J. D. North, who was at that time chief engineer to the Grahame-White Co., was engaged as chief designer, and he at once set to work on producing military machines. Of those which he designed, perhaps the best known is the "Bourges," which, in its first form, was designed for A.B.C. engines, but which has appeared since the war in slightly altered form, both with rotary engines and with Napier "Lions."

Mr. North is now, and has been for several years, chief engineer of the aviation department, and for some years has devoted his attention specially to metal construction. Examples of Boulton and Paul all-metal machines have been exhibited at the Paris Aero Shows, and experimental work is being undertaken on a large scale at Norwich. The latest machine to be completed for the Air Ministry is the "Bolton,"



The Boulton and Paul P. 9 two-seater, with 90 h.p. R.A.F. engine.

a photograph of which is published herewith. Owing to the many novel features of this machine, no detailed reference to it is permitted, but it is not too much to say that in the sphere of all-metal aircraft construction, Boulton and Paul hold a premier position. Their machines are built almost exclusively of steel, and in the main the highly-stressed

members of the structure are built up of rolled sections of very light gauge, a tremendous amount of research work having been done in the B. and P. laboratory in order to discover the best form of sections and the most satisfactory way of producing them. It is to be regretted that samples of Boulton and Paul steel construction will not be shown in Paris.



The "Bristol" 10-seater, with Bristol "Jupiter" engine.

Founded in 1909 by the late Sir George White, the Bristol Aeroplane Co. is one of the oldest aircraft firms in Great Britain. Originally, the firm was known as the British and Colonial Aeroplane Co., but the title was changed fairly recently to the present one. The managing director is now

Sir Henry White Smith. In the early days of its existence this firm built "Box Kites" of the H. Farman type, and these soon gained a reputation for excellence of workmanship, a reputation, incidentally, which this firm has worthily maintained right up to the present time. Sundry types of



The "Bristol" three-seater, with 100 h.p. "Bristol" "Lucifer" engine.

machines were designed at Bristol before the war, of which it suffices to mention a few, such as the Prier monoplane, the Coanda monoplanes and biplanes, and the Gordon England biplanes, all named after their designers.

A couple of years or so before the war the services of Mr. (now Squadron Leader) F. S. Barnwell were secured, and as chief designer to the firm, Barnwell was responsible for a number of successful "Bristol" machines, of which it will suffice to mention the Bristol "Bullet" (first known as the Bristol "Scout"), the Bristol fighter, the Bristol monoplane, and the Bristol "Badger." A little more than a year ago Squadron Leader Barnwell severed his connection with the firm, and accepted an appointment in the Australian Air Force. The last machine of Barnwell design is very unorthodox, and highly interesting, but as it is being built for the Air Ministry no reference to it is permissible.

Mr. W. T. Reid, who was Squadron Leader Barnwell's chief assistant, is now chief designer, and has already produced several machines, of which mention may be made of the huge "Braemar" triplane with four engines, the "Bristol" ten-seater, and, quite recently, the little three-seater, which was fully described in our issue of December 7, 1922.

In addition to these machines, Mr. Reid has designed a racing monoplane, which was intended as a challenger for the Coupe Deutsch, but which could not be got ready in time for that race. This machine is of very unusual design, its chief features being a very deep fuselage, very small monoplane wings, and a retractable undercarriage.

The Bristol Aeroplane Co. also manufacture the famous "Bristol" radial air-cooled engines the "Jupiter" and "Lucifer," reference to which will be made under the Aero Engine section.



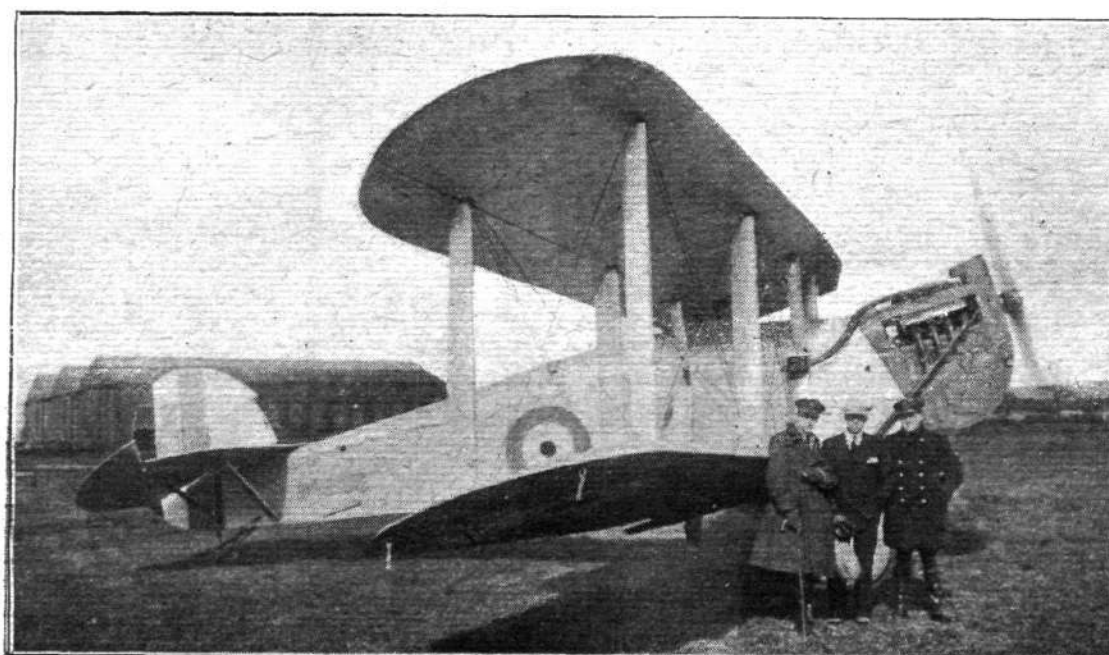
The Blackburn "Dart" Fleet Spotter.

The earliest Blackburn aeroplane was designed and built by Robert Blackburn at the beginning of 1909, and from that date until the present time the history of Blackburn aircraft has been one of steady progress, and Mr. Robert Blackburn, the founder of the firm, has remained with it ever since as managing director.

During the war the Blackburn Aeroplane and Motor Co., Ltd., of Leeds, built, at first, various types of machines under licence. It was not long, however, before they turned their attention to original design, and a number of different types were produced, seaplanes as well as land machines. Among the latter, probably the type which became best known

was the "Kangaroo," a twin-engined bomber with two Rolls-Royce engines.

A type of machine upon which the Blackburn Aeroplane and Motor Co. have specialised for a number of years is the torpedo plane, and Blackburn machines of this type are now being introduced into both British and foreign air services. One of the best-known modern Blackburn torpedo planes is the "Swift," which has a Napier "Lion" engine. Another modern Blackburn is the "Dart" Fleet Spotter, about which, however, nothing regarding its constructional details may be published at present. We give, however, a photograph of this machine.



The Blackburn "Swift" Torpedo 'Plane, Napier "Lion" engine.

## WILLIAM BEARDMORE AND CO., LTD.



The Beardmore W.B.2 Commercial Biplane, with 160 h.p. Beardmore engine.

The business of Wm. Beardmore and Co., Ltd., of Glasgow, is chiefly that of steel manufacturers, shipbuilders, and general engineers on a very large scale. They have nine works in and around Glasgow, and, further, hold a controlling interest in many other British industrial enterprises.

During the war this firm produced nearly 700 aeroplanes and seaplanes of various types, ranging from the Sopwith "Baby" to the four-engined Handley-Page bomber. After the war, Beardmores turned their attention to commercial aircraft, and several types of all-metal machines were produced, among which we mention the WB2, with 160 h.p. Beardmore engine. For the Air Ministry competition at Martlesham in 1920, Beardmores undertook the design of

a large all-metal multi-engined flying boat (amphibian), but the machine was not finished in time for the competition and has never, we believe, been completely finished.

It is, of course, well known that Wm. Beardmore and Co. are also airship constructors, and at the large airship shed at Inchinnan were constructed the large rigid airships R.24, R.27, R.34 (which made the double crossing of the Atlantic), and R.36, the last-mentioned being of 3,000,000 cubic feet capacity. The aeroplane and seaplane construction works are situated at Dalnair, and cover an area of 100 acres, with a frontage of 1½ miles on the river Clyde.

To the Beardmore aero engines reference will be made under that heading.

*The DE HAVILLAND AIRCRAFT Co. Ltd. Edgware*



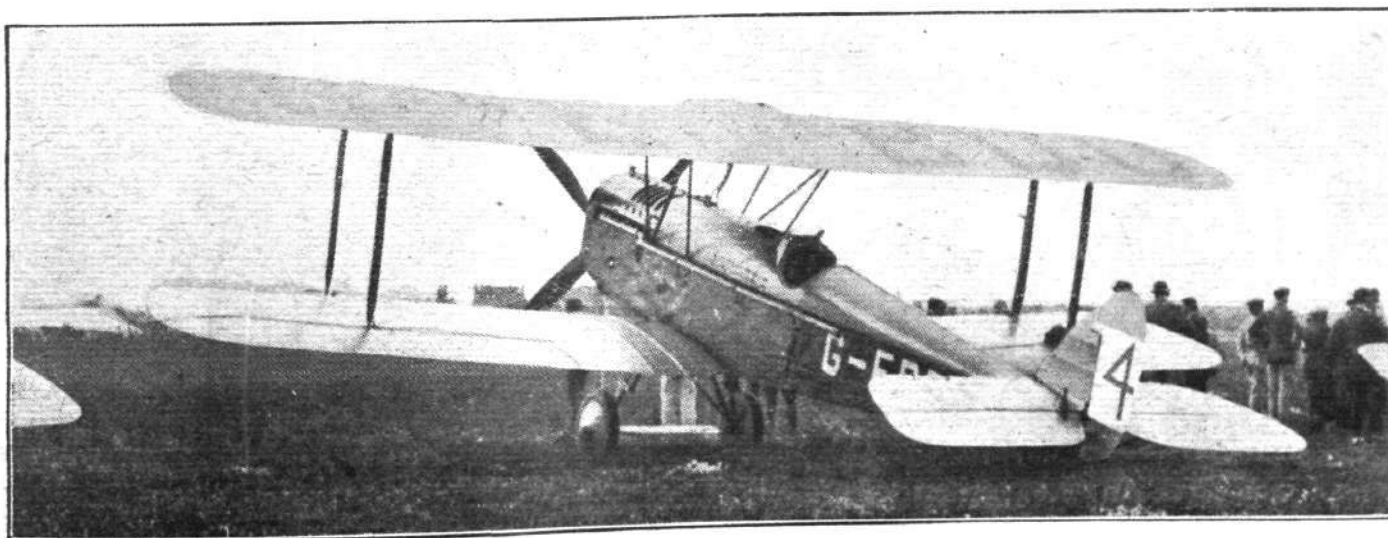
*Capt. G. de Havilland*  
Technical Director





*C. C. Walker*  
Director and Chief Engineer

The D.H. 27 "Derby," fitted with Rolls-Royce Condor engine.



The D.H. 37, with 275 h.p. Rolls-Royce "Falcon" engine.

Captain Geoffrey de Havilland is one of our oldest aircraft designers (in experience at any rate, although not in years), his first machine being built in 1909. For a number of years Capt. de Havilland was a designer at the Royal Aircraft Factory (as it then was, now the Royal Aircraft Establishment) at Farnborough, and among the best-known of his machines from that time is the original B.E. Shortly after the war Captain de Havilland joined the Aircraft Manufacturing Co. as Technical Director, and the world knows the number of successful machines which he turned out during the war, from the D.H.1 "pusher" to the D.H.10 twin-engined bomber.

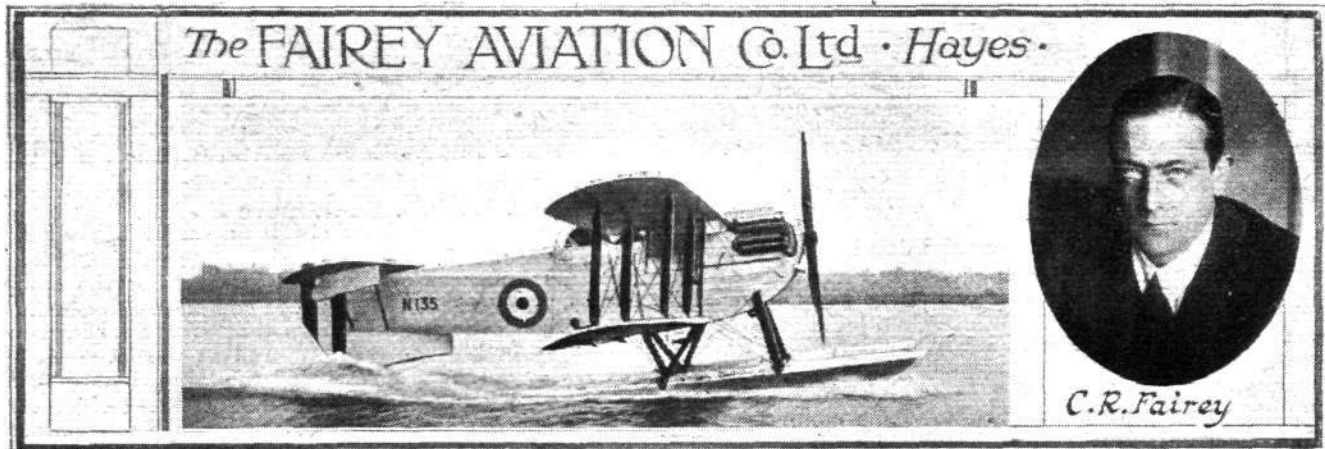
When the "Airco." (as the Aircraft Manufacturing Co. had become known) closed down after the war, Captain de Havilland established his own company at Stag Lane, Edgware, Middlesex, and he brought with him several of those who had been associated with him at the Airco., notably

Mr. C. C. Walker, who is now his chief engineer, and Mr. Hagg, chief of the de Havilland drawing office staff.

The de Havilland Aircraft Co. have produced a number of commercial machines, of which the best known are perhaps, the D.H.18, the D.H.34 (which is now very extensively used), the D.H.37, a fast touring machine, and the D.H.29, a thick-wing cantilever monoplane with Napier "Lion" engine. Recently a bomber, known as the "Derby," has been finished and other interesting machines are in the offing.

Run as a separate concern is the de Havilland Hire Service, which provides, at a moment's notice, taxiplanes which take passengers to any point in Europe. This section of the firm has also met with great success, and some very notable flights have been carried out, notably by Mr. Alan Cobham.

Recently a flying school has been started at the Stag Lane aerodrome, and this promises to become as successful as the other de Havilland undertakings.



The Fairey Amphibian "Pintail," Mark III, 450 h.p. Napier "Lion" Engine.

THE Fairey Aviation Co., Ltd., of Hayes, Middlesex, was founded in 1915 by Mr. C. R. Fairey, who had previously been on the technical staff of Short Brothers, of Rochester and Eastchurch. Mr. Fairey is chairman of the firm, and is also designer and chief engineer, his chief assistant being Mr. F. Duncanson, with Mr. A. C. Barlow as chief draughtsman.

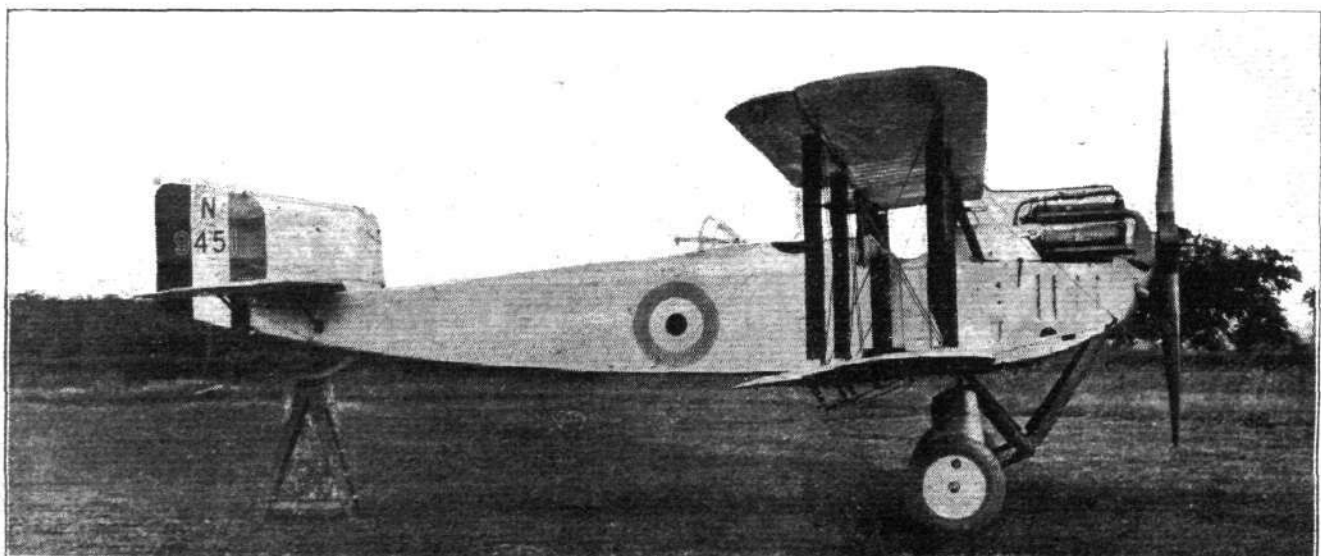
At the Hayes Works, of which Mr. W. Broadbent is manager, the Fairey Aviation Co. have produced a number of interesting machines, starting during the war with a twin-engined fighter (land machine), and with the following seaplanes and amphibians in close succession: the "Campania," the "Hamble Baby," the N.9, the N.10, with its successors, the IIIA, IIIB, IIIC and IIID types. With the exception of the N.9, all these went into production for war use. In 1918 Mr. Fairey designed the N.4.

Since the Armistice, the Fairey Aviation Co. have produced a number of types, but owing to the fact that all have been designed for the Air Ministry, no detailed reference is possible. A few of the types may, however, be mentioned, such as the "Pintail" Marks II and III, the improved IIID, the

"Fawn" and the "Flycatcher" types. Several experimental amphibians have also been built, and it may be recalled that the machine on which the Portuguese aviators Cabral and Coutinho flew from Lisbon to South America was a Fairey seaplane.

This firm has done a considerable amount of experimental work on oleo undercarriages, and have made great improvements in float construction.

It might also be mentioned that the Fairey variable camber flap gear has recently been tested at Martlesham Heath experimental station with markedly successful results. Less known is probably the fact that the Fairey Aviation Co. have done a considerable amount of work on metal construction, all with high-grade steels. The policy has been to substitute gradually metal parts for wood units, and now Fairey machines are composed of nearly 50 per cent. metal. Several all-metal designs are in hand. The company's works at Hayes and Hamble (near Southampton) now cover some 140,000 square feet of area and employ at the present moment about 450 hands, with a technical staff of 30, which is being further increased.



The Fairey Series III Military Aeroplane, 450 h.p. Napier "Lion," has variable camber wings and long-travel oleo undercarriage.

## GLOUCESTERSHIRE AIRCRAFT Co. Ltd. Cheltenham.



**D. Longden**  
Director





**H. P. Folland**  
Chief Engineer and Designer

### The Gloucestershire Aircraft Co.'s "Mars I," Napier "Lion."

Founded as an aircraft firm in 1915 (although having been in existence in a different line of business long before that time) the Gloucestershire Aircraft Co., Ltd., of Cheltenham, Gloucestershire, at first centred their attention upon the production of machines to Government design. An idea of the capacity of the Sunningend works may be formed when it is mentioned that the average output during the war was 20 machines per week. After the war Mr. A. W. Martyn, chairman and managing director of the firm, and Mr. D. Longden, one of the directors, decided that the firm, having taken up aircraft construction so successfully during the war, should become permanently an active member of the aircraft industry. A slight rearrangement of the firm was consequently carried out, and Mr. H. P. Folland, who had until the closing down of that firm been chief designer to the British Nieuport Co., was engaged as chief engineer and designer.

Mr. Folland brought with him from the Nieuport company several of the members of the Nieuport designing staff, many of whom had been with Mr. Folland when he was at the Royal Aircraft Establishment at Farnborough, where he did much of his early work, having had a considerable share in the design of such machines as the F.E.2, the F.E.4 and the S.E.5A, the last mentioned being a machine which was built in very large number and extensively used in many parts of the world.

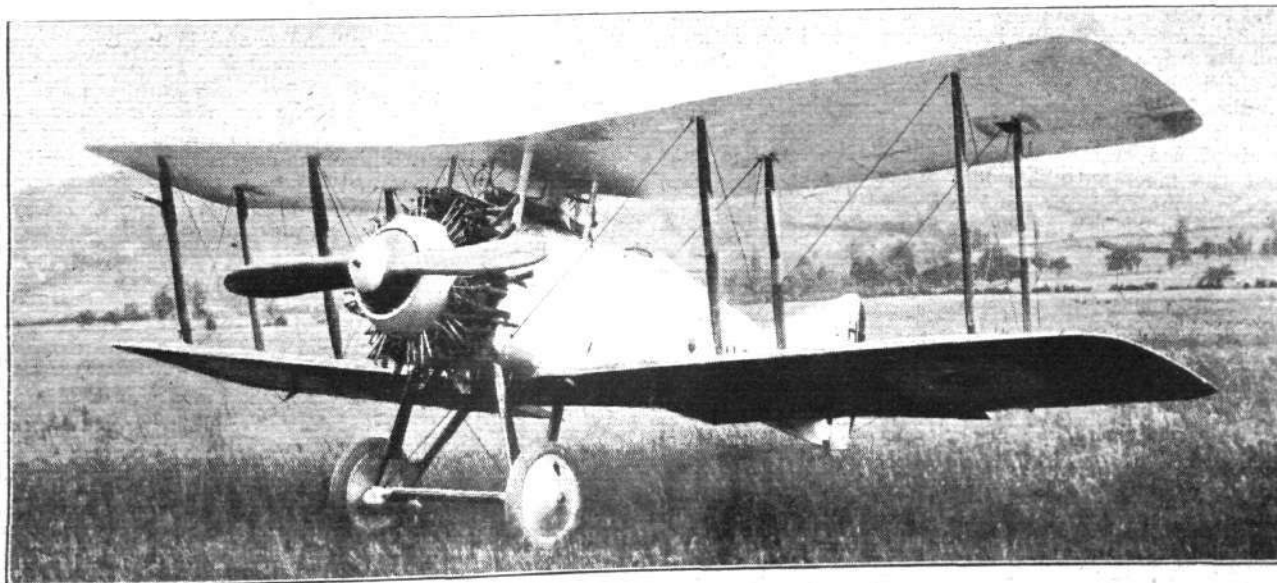
While with the Nieuport and General Aircraft Co., Mr. Folland designed the Nieuport "Nighthawk," with A.B.C. "Dragonfly" engine. This machine was accepted

by the Air Ministry for the 1919 programme, but the cessation of hostilities resulted in the many orders placed for the "Nighthawk" being cancelled. A twin-engined bomber, and the single-seater "Goshawk" were also designed and built. It was practically inevitable, however, that machines of this standard of performance would lead to even greater things, and this promise has been more than fulfilled.

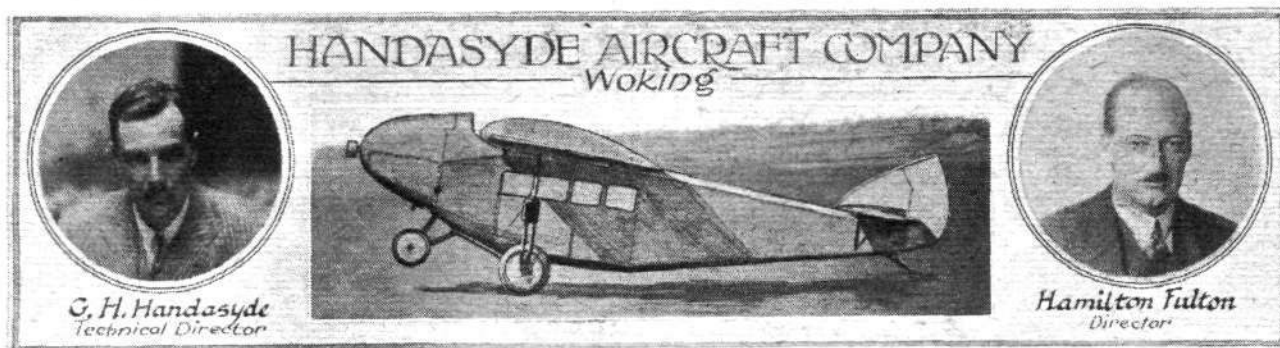
Since the year 1921, Mr. Folland has designed for the Gloucestershire Aircraft Co. the famous "Mars I," with 450 h.p. Napier "Lion" engine, which holds the British speed record, and which but for the unfortunate affair with the pilot's maps might well have won the Coupe Deutsch this year. It may also be recalled that it has won the Aerial Derby for two years in succession, and is still going strong.

Another type produced by Mr. Folland since joining the Gloucestershire firm is the "Sparrowhawk," which is generally similar to the "Nighthawk" except that it has a B.R.2 rotary engine. This company has produced a large number of machines for the Greek and Japanese Governments, those built for the latter having now been in service for about a year, and the purchasers having been entirely satisfied with them.

Recently the "Nighthawk" has been brought up to date by being fitted with a Siddeley "Jaguar" engine. The modified type is known as the "Mars VI," and it is worthy of note that it combines with a speed of 150 m.p.h. a climb of 20,000 ft. in 18 minutes with full military load, a very meritorious performance.



The Gloucestershire Aircraft Co.'s "Mars VI," fitted with Siddeley "Jaguar" engine, a machine which has fine climbing and speed performances.



Side view of the Handasyde Cantilever Monoplane with "Eagle IX" engines.

After severing his connection with Martinsyde, Ltd., of Woking, of which firm he had been a partner since 1909, Mr. G. H. Handasyde formed, with Mr. Hamilton Fulton, the Handasyde Aircraft Co., Ltd. This was in 1921, and the firm has been handicapped to a certain extent by not having their own construction works. Now, however, we are glad to be in a position to announce that this difficulty has been overcome, arrangements having been completed for obtaining control and supervision of the aircraft section of the Air Navigation Co., Ltd., of Addlestone (formerly Bleriot Aeronautics). The board of directors will be added to shortly by Mr. F. P. Raynham and Maj. A. Graves joining. The H.A.C. will in the future be in a position to undertake design and construction work of any kind.

Since the formation of the company Mr. Handasyde has designed several machines, notably a cantilever monoplane, fitted with one of the new Rolls-Royce "Eagle IX" engines. This machine was designed for one of the air mail services in Australia, and we understand that more machines of similar type are to follow. The machine was fully described in *FLIGHT* of July 20, 1922.

It may also be recollected that the glider on which Raynham flew for 1 hr. 53 mins. at Itford was built at Addlestone for the H.A.C. firm. The same applies to the commercial monoplane, and under the new arrangement all future H.A.C. machines will be built there. We regret that no photographs of the H.A.C. monoplane are available at the moment, but we hope to publish some shortly.



The Handley Page "Hanley" Torpedo Plane, Napier "Lion" engine.

Mr. F. Handley Page, as is, of course, well known, is one of the pioneer British aircraft constructors, having built his first machine, a monoplane with crescent-shaped wings, in 1909. Since that distant date Mr. Handley Page has been, without interruption, actively connected with aviation, although the firm of Handley Page, Ltd., in its present form, was established many years later. In the earliest days Mr. Handley Page specialised on monoplanes, of which type he produced several. In 1914 he designed a biplane, which still retained the crescent-shaped wings. Then came the war, and the machine which laid the foundation for the fame of the name Handley Page was the large twin-engined bomber o-400, which was fitted with two Rolls-Royce engines.

The history and activities of machines of this type during the war are well known, and the effect of the type can still be clearly traced in the majority of modern twin-engined machines.

In order to increase the range and bomb capacity of an aeroplane, Mr. Handley Page and Mr. C. W. Meredith, his chief engineer, who has been with Mr. Handley Page since the earliest days, designed the huge four-engined bomber known as the V-1500, which was intended for the bombing of Berlin. In this machine the engines were placed in pairs, one behind the other, on the wings.

Several other types were designed during the war, but these did not reach the production stage.



The Handley Page W. 8 B, with two Rolls-Royce "Eagle" engines.

Since the war Handley Page, Ltd., have produced a number of commercial types, all being clearly developments of the original o-400. First of all the firm produced the W.8, with two Napier "Lion" engines, which won the Air Ministry competition (large class) at Martlesham Heath. This machine was for some time put on the London-Paris route, where it made some trips in record time. A later development was the W.8.B, which was fitted with Rolls-Royce "Eagle" engines and carried 12 passengers. For next year's services a further development, the W.8.C will be put on, this machine to have seating accommodation for 16 passengers.

Lately Handley Page, Ltd., have turned their attention to the design and construction of torpedo planes, of which mention may be made of the "Hanley," in which, for the first time, use has been made of the slotted wing invented by Mr. Handley Page. A D.H.9 was first fitted with slotted

wings in order to test the idea, and the results were so promising that a cantilever monoplane wing with slots was fitted to a D.H.9 fuselage in order to test the effect of slots on a high-lift wing (the section being airscrew 4). It was found that again the full-size results bore out the model experiments, and consequently the "Hanley" torpedo plane was built to incorporate the slots in a machine designed for a specific military purpose. The first of the "Hanley" machines had rather ugly wing tips and a complicated undercarriage. In spite of these drawbacks the machine had a good performance, and in the latest type of "Hanley" a simpler undercarriage and finer wing tips have resulted in an increase in speed of 10 m.p.h.

Concerning the activities of the operational side of the firm, known as Handley Page Transport, Ltd., something will be found elsewhere in this issue.

## THE HAWKER



## ENGINEERING CO., LTD.

T. O. M. Sopwith, Director.

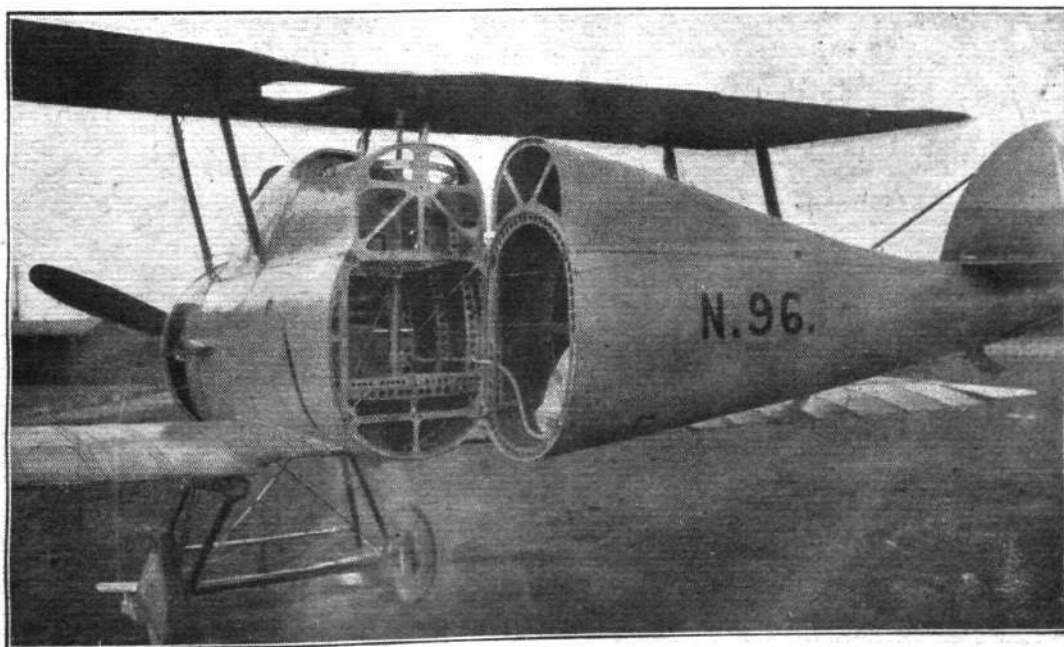
Upon the Sopwith Aviation Co. going into liquidation in 1920, the H. G. Hawker Engineering Co., Ltd., was formed by the late Mr. H. G. Hawker, Mr. F. Sigrist and Mr. T. O. M. Sopwith. The late Mr. Hawker was, as is well known, test pilot to the Sopwith Aviation Co., and Mr. Sigrist was, from the founding of that firm up to 1919, works manager, while Mr. Sopwith will need no introduction, his name being famous all over the world as one of the first British pilots and founder of the Sopwith Aviation Co., whose products during the war were among the first in the world.

In the Hawker Engineering Co. Mr. F. Sigrist is managing director, other directors being Mr. T. O. M. Sopwith, Maj. V. W. Eyre, Mr. F. L. Bennett, who is acting as works

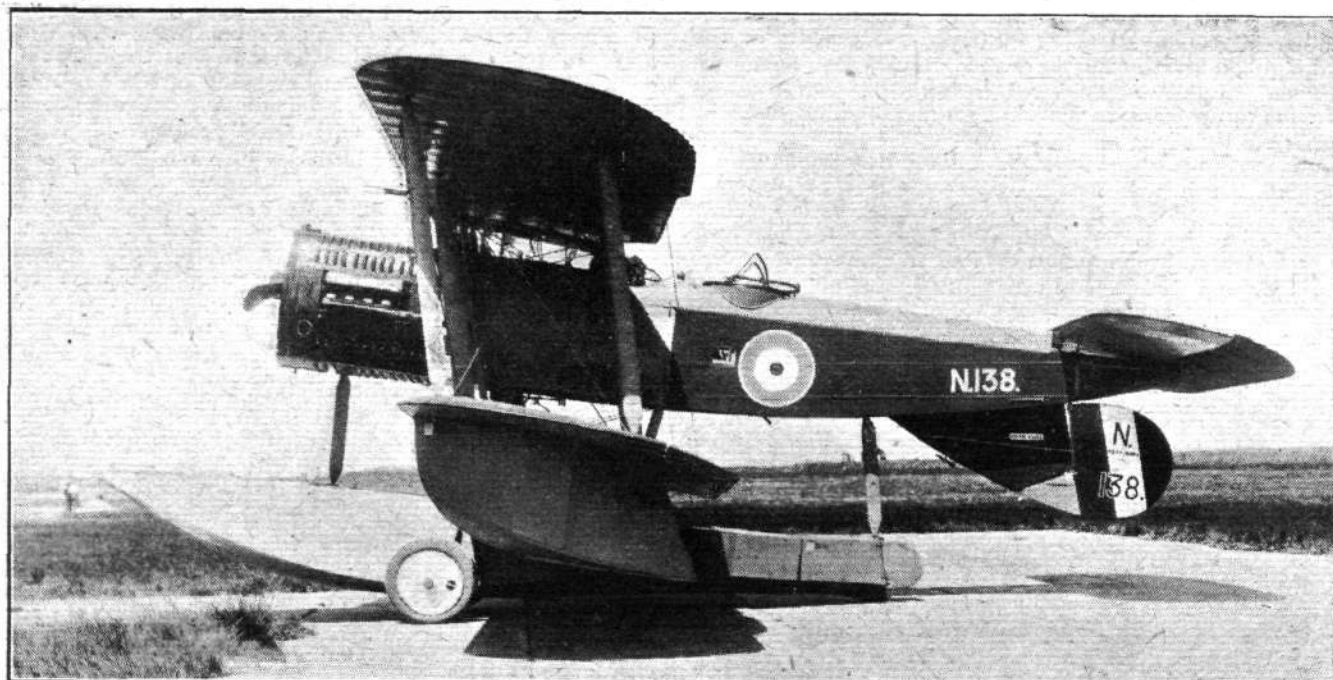
manager, and Capt. L. F. Peaty, brother-in-law of the late Mr. Hawker. The chief designer of the firm is Capt. B. Thomson.

The H. G. Hawker Engineering Co. started at the old works of the Sopwith Aviation Co. at Kingston-on-Thames, and have now taken over the whole of the main premises. At present they are engaged upon re-conditioning a large number of D.H.9A's and Sopwith "Snipes." Two new designs by Capt. Thomson have been submitted to and accepted by the Air Ministry, and are at present under construction. Little may be said about them, except that one is a reconnaissance two-seater cantilever monoplane, and the other a single-seater fighting scout.

## GEORGE PARNALL AND CO., BRISTOL



The Parnall "Panther" is a ship's 'plane with folding fuselage [instead of the more usual folding wings.




The Parnall "Puffin" deck-landing amphibian, with Napier "Lion" engine.

Founded during the war by the present proprietor, Mr. George C. Parnall, this firm has built a great number of machines of different type, having specialised for several years on seaplanes, amphibians and ship's planes, although recently other types are being developed. Of the best-known types produced by Mr. Bolas, chief designer to the firm, mention may be made of the Parnall "Panther," a ship's plane of unorthodox design in which, instead of folding the wings, as is the usual practice, space is saved by

so designing the *fuselage* that its rear portion hinges and can be swung aside until it lies parallel with the wings.

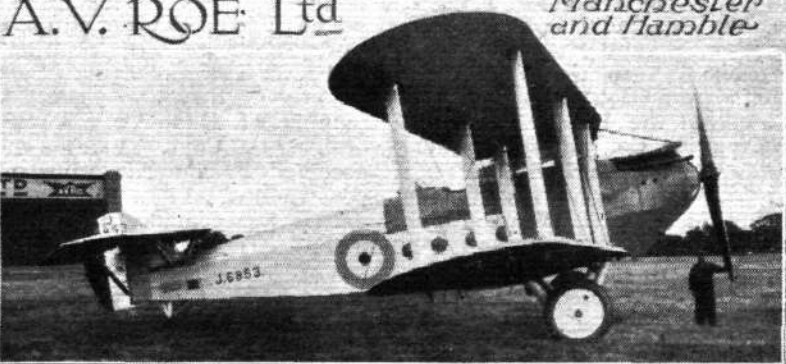
The Parnall "Puffin" is an amphibian seaplane with Napier "Lion" engine, and its tail is designed with the fin and rudder entirely below the level of the tail plane, so as to give the rear gunner a free field of fire.

At present the firm is completing two new types, one of which, the Parnall "Possum," is a triplane incorporating several novel features.




A.V. Roe  
Managing Director

**A.V. ROE Ltd**

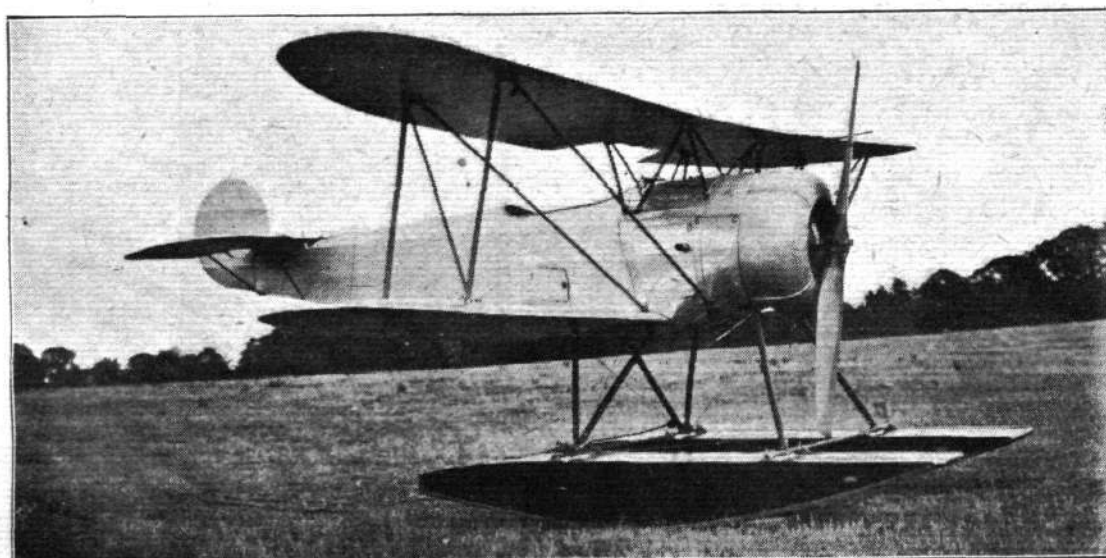


Manchester and Hamble

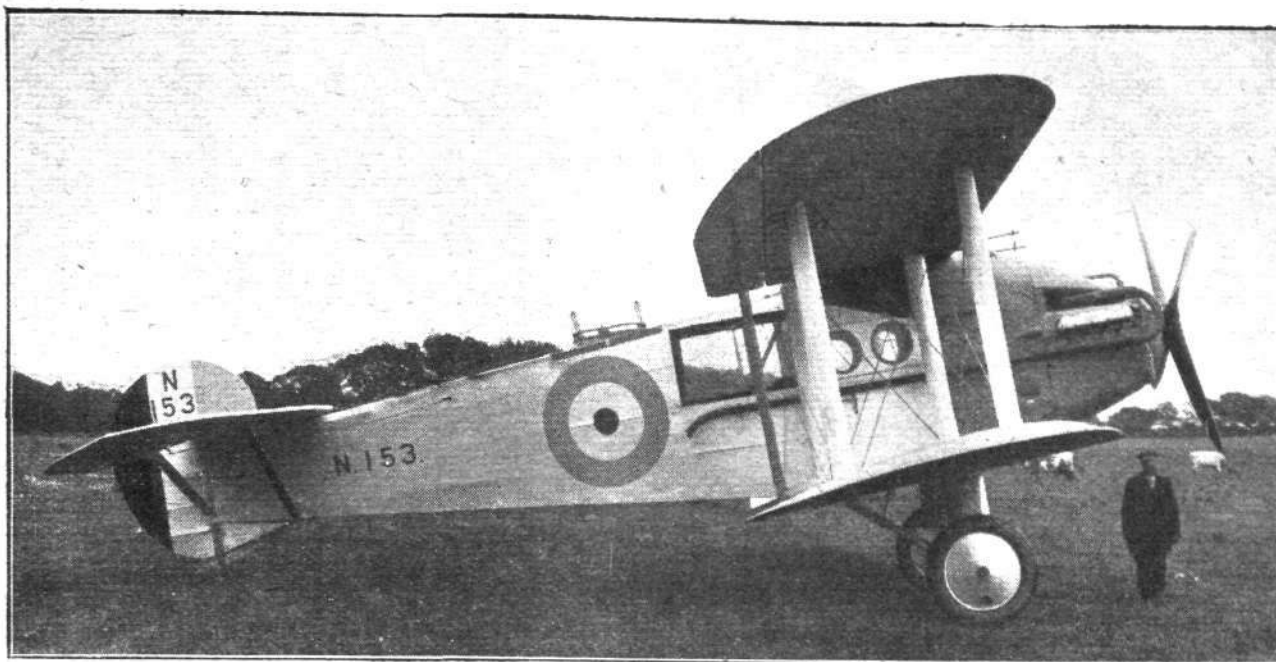


John Lord  
Director

The Avro "Aldershot," fitted with Rolls-Royce "Condor."



The Avro 80 h.p.  
Le Rhone Sea-  
plane Two-  
seater.

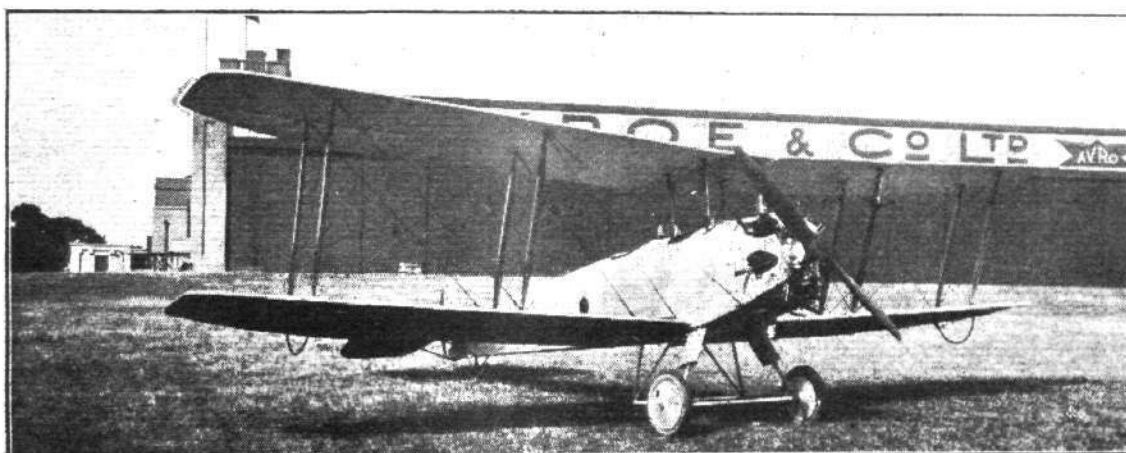


The Avro "Bison" is a Fleet Gunnery Spotting Aeroplane fitted with Napier "Lion" engine.

The name Roe, and particularly Avro, into which the name A. V. Roe was early contracted, is well known all over the world, Mr. Roe being one of the pioneers, not only of British aviation but of aviation generally. To Mr. A. V. Roe belongs the credit of having introduced the tractor machine which now holds the field almost to the exclusion of all other types.

pre-war type 504 which has done most towards carrying the name Avro to the far corners of the earth. In a number of variations the 504 has made its appearance, with different engines, and it should be remembered that this continues to be the standard training machine of the R.A.F.

Since the war Mr. Roy Chadwick, who has been with



The Avro 504K is fitted with a 175 h.p. Siddeley "Lynx" Engine.

It should also be recalled that "A.V.," as he is affectionately known among his friends, designed the first two totally enclosed aeroplanes in Great Britain.

During the war A. V. Roe and Co. designed and produced several different types of machines, but probably it is the

Mr. Roe ever since the early days, and who is now chief designer for the firm, has designed several types, of which we can only mention a few. The Avro Baby with 35 h.p. "Green" engine has been made famous by Bert Hinkler's flight from London to Turin without landing.



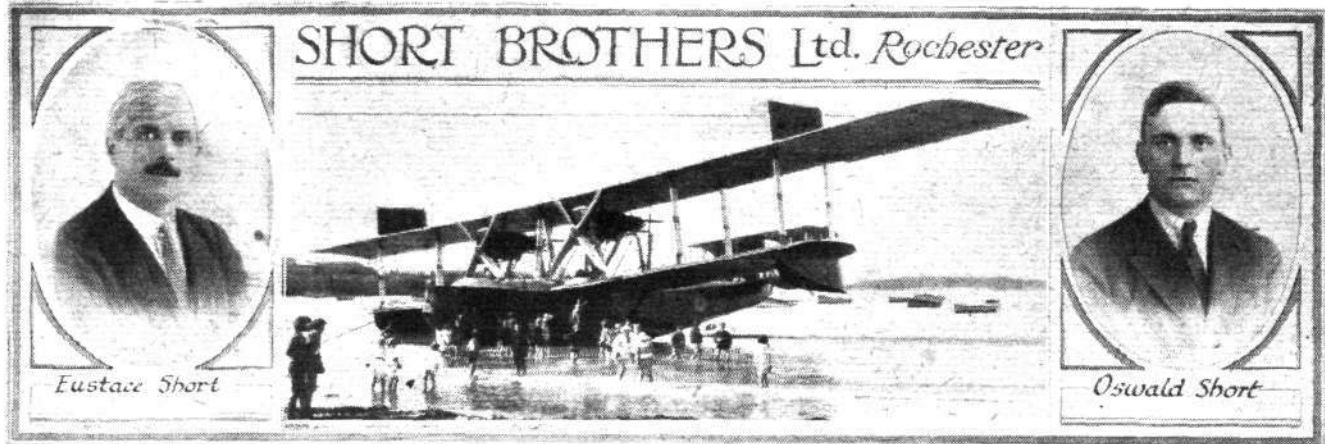
The Avro-Viper, Wolseley-Viper engine.

A somewhat similar machine, but with 80 h.p. le Rhone, was built for the Shackleton expedition, but was not, unfortunately, actually carried, the ship having to abandon its call at Cape Town, whither the *Baby* had been sent.

A recent modification of the 504 is the 504 K, Mark II, which is fitted with a 175 h.p. Siddeley "Lynx" engine. This machine is fitted with oleo undercarriage and improved type *ailerons* which harmonise all the control surfaces. The Avro "Viper" is also a modification of the original 504,

but is fitted with a Wolseley "Viper" engine. This machine is produced both as a land machine and as a seaplane, and a considerable number have been sold to foreign governments.

Among the latest machines to be produced at the Hamble works of A. V. Roe and Co. mention may be made of the "Aldershot" with 1,000 h.p. Napier "Cub" engine, the "Aldershot" bomber, with 680 h.p. Rolls-Royce "Condor" engine, and the "Bison," with Napier "Lion" engine. The last mentioned is a fleet spotter.

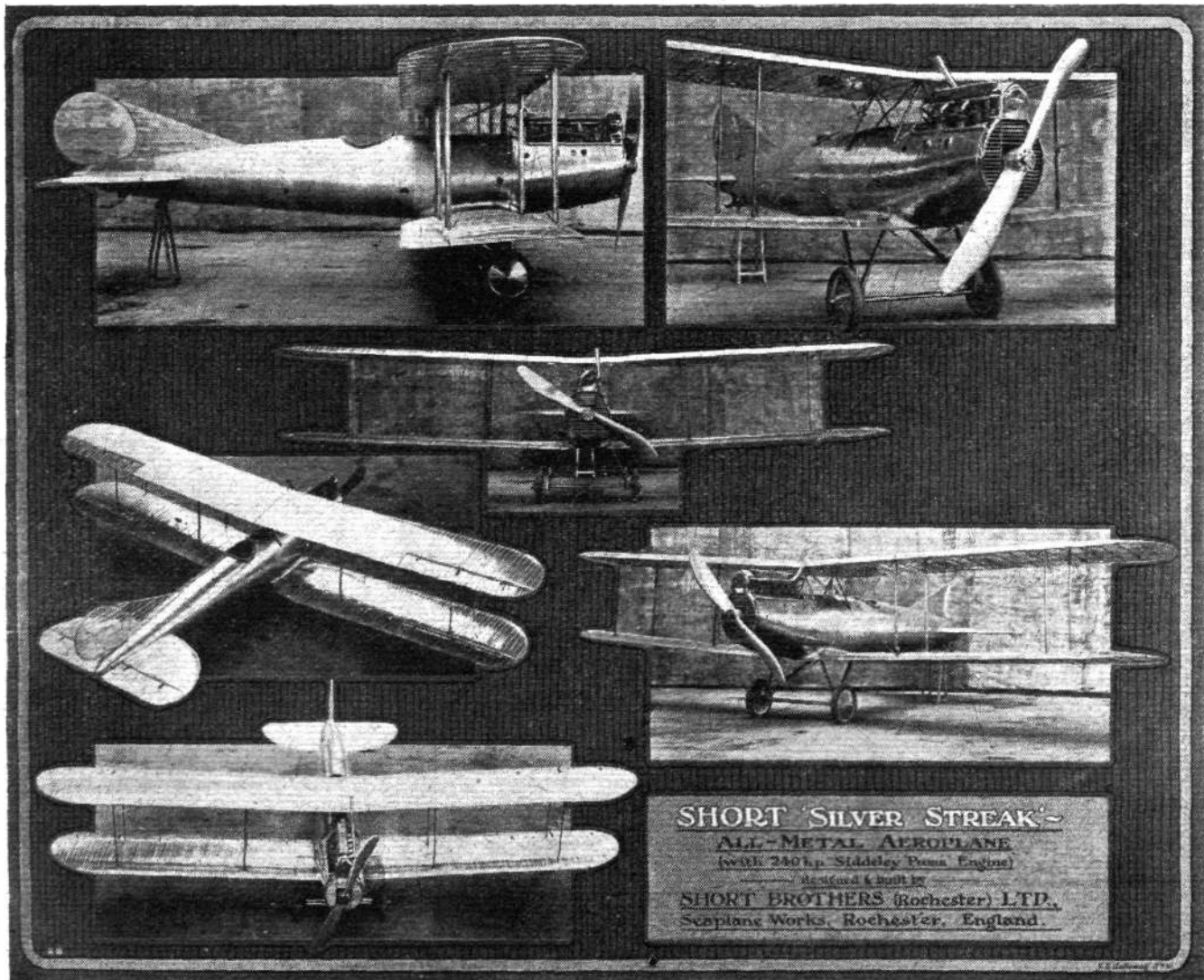


The Short "Cromarty" is fitted with two Rolls-Royce "Condor" engines.

One of the first British aircraft firms to be established was that of Short Brothers, who commenced their activities as aeroplane and seaplane constructors (although having previously been manufacturers of balloons) in 1909 at Eastchurch, Isle of Sheppey. The first machines built were of the Wright type, but later machines more resembled the Farman "box kites," although they had a *nacelle* with a very small front elevator mounted in the nose.

Short Brothers also were among the very first to fit more than one engine in a machine, and several years before the war they produced machines with two and three Gnome engines.

Of the machines produced during the war, before the death of one of the brothers, Mr. Horace Short, perhaps the most famous was the Short "225," as it became known from the power of its Sunbeam engine. A twin float seaplane, this



The Short "Silver Streak" all-metal biplane.

type was used extensively by the Royal Naval Air Service, who frequently used it for extended flights inland, although the machine was not fitted with a wheel undercarriage. It should also be pointed out that Short Brothers were the originators of folding wings, having patented an arrangement for doing this long before the outbreak of war.

In metal construction Short Brothers have also been among the leading firms, having first built rigid airships at their Bedford works, and later produced all-metal machines at Rochester, Kent. One of these, the "Silver Streak," was exhibited at an Olympia Aero Show, and was built entirely of metal, even to the wing covering, which was duralumin. A development of this machine is now being produced, but as it is for the Air Ministry nothing may be said about it at present.

Although Short Brothers have been mostly associated with twin-float seaplanes, they have also produced flying boats, and one of these, the "Cromarty," has recently taken part in development flight off the South West coast of England, putting up a very good performance, although the machine

was laid down five years ago. The following particulars of the Short "Cromarty" may be of interest: Span, 112 ft. Length 60 ft. Height 23 ft. Weight of machine empty 10,692 lbs. Petrol for 7 hrs. (540 gallons) 3,888 lbs. Oil 540 lbs. Reserve water 80 lbs. Machine guns, ammunition and mountings 750 lbs. Two 500 lb. bombs and gear 1,150 lbs. Sea anchor 150 lbs. Starting gear 100 lbs. Crew of five 900 lbs. Total military load 7,808 lbs. Total loaded weight 18,500 lbs. Engines: Two Rolls-Royce "Condors" of 600 h.p. each. Full speed at sea level 96 m.p.h. Climb to 6,000 ft. in 20 mins.

For long-distance reconnaissance the "Cromarty" can be flown with engines throttled down to a cruising speed of 90 m.p.h., when the range is approximately 800 miles. The numerous machine guns carried render this machine practically safe from attack, while the weight of bombs make it a formidable weapon of offence. Owing to its size, the "Cromarty" is able to follow the Fleet to sea, and can be moored out for considerable periods without undue deterioration.

**The SUPERMARINE · AVIATION · WORKS · Ltd. Southampton**



*H. Scott-Paine*  
Managing Director





*Commander J. Bird*  
Director

#### Supermarine "Sea Lion" II.

Founded by Mr. N. Pemberton Billing in 1912, the Supermarine Aviation Works of Southampton, with which Mr. Billing is no longer connected, the firm having been taken over by Mr. Hubert Scott Paine and Commander James Bird, have ever since they started work kept as their motto "Not an aeroplane that will float, but a seaworthy boat hull which will fly." This motto was laid down as an ideal to be attained, and through years of extraordinary difficulty the ideal was always kept in view, with the result that the firm, having started with a seaworthy boat hull, the time has now come when that hull has been made to fly. Not that the first hulls did not fly; the expression fly is used in the sense of performance. At first the machines were somewhat heavy and slow, but seaworthy they were, and as a result of painstaking application the performance has now been attained without sacrificing seaworthiness.

The first flying boat built by the Supermarine works in 1912 incorporated a feature which has been retained ever since, *i.e.*, the circular section hull, with the steps built on as separate units.

In 1916 this firm built what was probably the first flying boat to attain a speed of 100 m.p.h. In 1917 they designed and built the first single-seater flying boat scout, which attained the, at the time, astonishing speed of 118 m.p.h. In 1919 the Supermarine Works completed a single-seater flying boat scout which did 149 m.p.h. This machine took part in the Schneider Cup race at Bournemouth. During the same year the firm had the distinction of becoming the first British firm to obtain an Air Ministry certificate of airworthiness for marine flying machines, and it also opened up the first flying boat service in the British Empire, running a regular service by flying boat between the base at South-



The Supermarine "Seal" Amphibian flying boat, 450 h.p. Napier "Lion" engine.

ampton and places along the South coast. Towards the latter part of 1919 they inaugurated the first international marine air service by running their flying boats between Southampton and le Havre.

for a very large twin-engined amphibian which will be the largest amphibian flying boat in the world. The construction of both these machines is now nearing completion.

Finally it should be recalled that in the summer of this



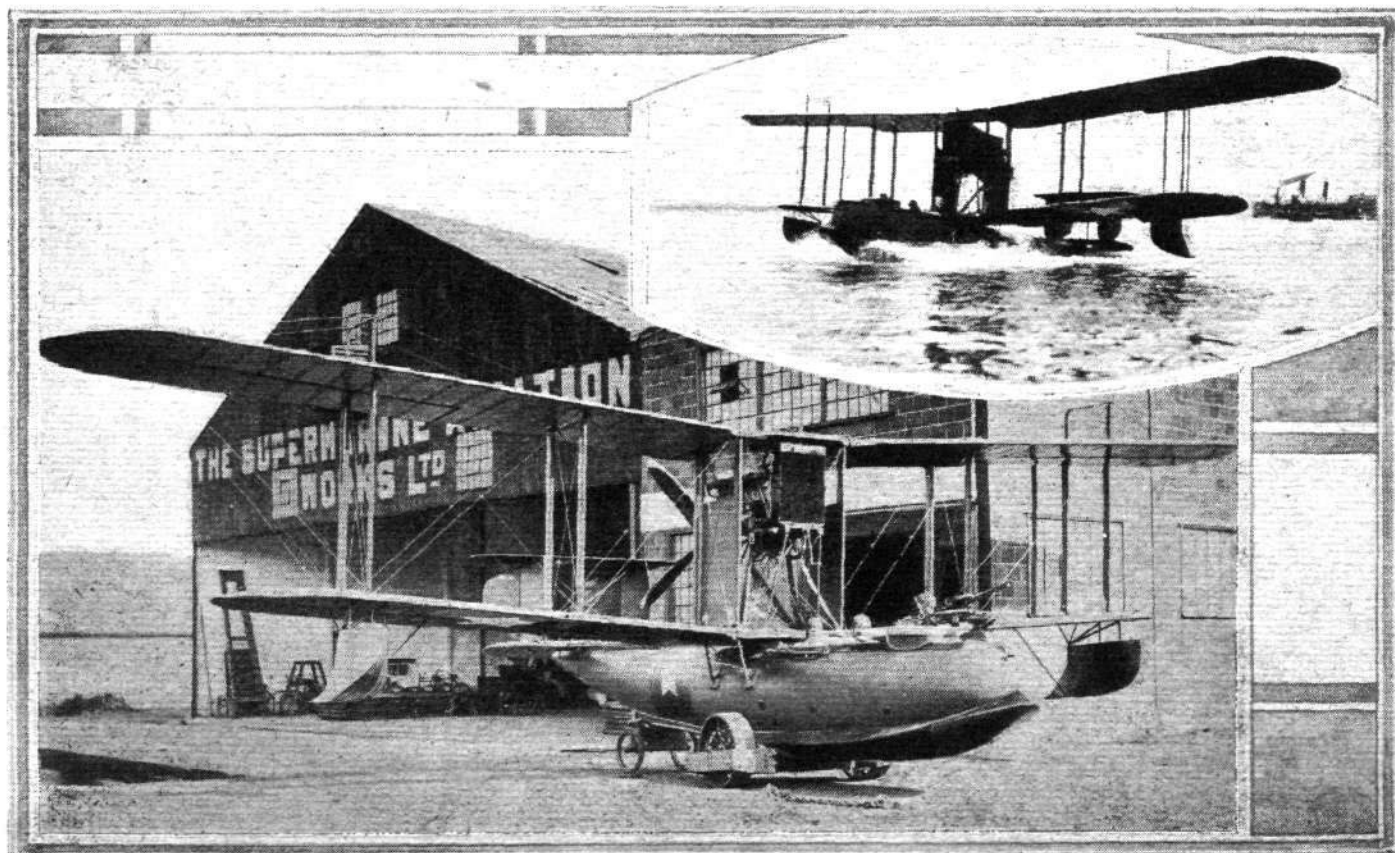
The Supermarine "Sea Lion," which won the Schneider seaplane race at Naples. This machine is fitted with a Napier "Lion" engine.

In the Air Ministry competition for amphibian machines in 1920 a Supermarine amphibian flying boat was awarded a prize of £4,000, together with a further amount of £4,000 which was granted specially by the British Government in recognition of the unusual merit of the machine, which passed the arduous tests over land and sea without any breakage, and even without any adjustment being necessary.

In 1921 this firm produced the first amphibian flying boat to be specially designed for operations by the R.A.F. in connection with the British Navy. In 1922 the Supermarine Aviation Works received an order from the Air Ministry for the largest flying boat to be built since the war, and another

year the Supermarine Works designed and built the fast flying boat, with Napier "Lion" engine, which brought to Great Britain the Coupe Schneider, with the result that next year's race for this Cup will be flown in this country. Not only did the Supermarine "Sea Lion" win the Schneider race, but it established a world's speed record for flying boats.

The Supermarine flying boats are to be found in all parts of the world. They have been supplied to a great number of foreign powers, and in many places such as Fiji, British Guiana, Trinidad, Bermuda, Venezuela, etc., their machines have been the first marine aircraft ever to be seen.



The Supermarine "Channel" type, Mark II, which has a 230 h.p. Siddeley "Puma" engine.

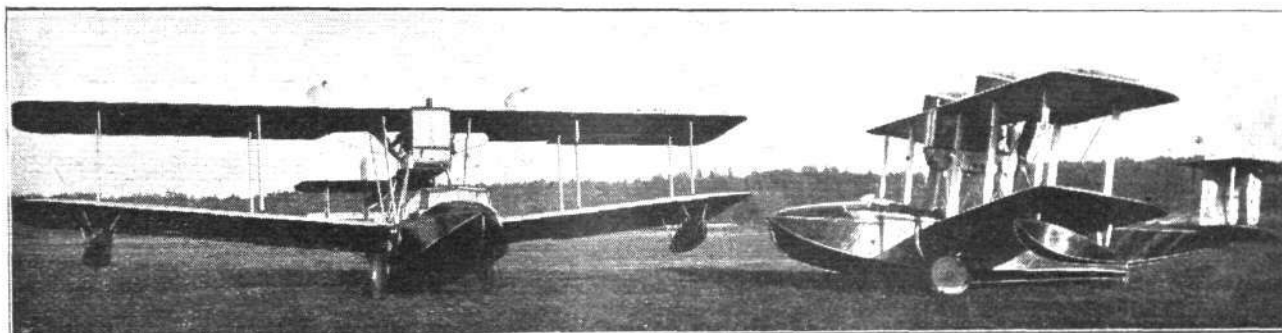


The Vickers "Vulcan" eight-seater, with 360 h.p. Rolls-Royce "Eagle" engine.

Already several years before the war the famous firm of Vickers, Ltd., had an aviation department, and were actively engaged upon the construction of aircraft. For a number of years the aviation department was managed by Major Wood, while the late Mr. Harold Barnwell was chief test pilot and instructor at the flying school which Vickers, Ltd., had established at Brooklands. Among the machines of those early days may be recalled sundry monoplanes of the R.E.P. type, and a number of "box kites" of the Farman type.

types, some for commercial use and others for military purposes. Under the energetic management of the aviation department by Capt. P. D. Acland, who took over this post on the death of Major Wood, Vickers aircraft have been introduced in most of the civilised countries of the world.

The first commercial type to be produced after the war was the Vickers "Vimy-Commercial," with two Rolls-Royce "Eagle" engines. This machine has been extensively used on the London-Continental services.



Two Vickers "Viking" Amphibians, with Rolls-Royce "Eagle" engines.

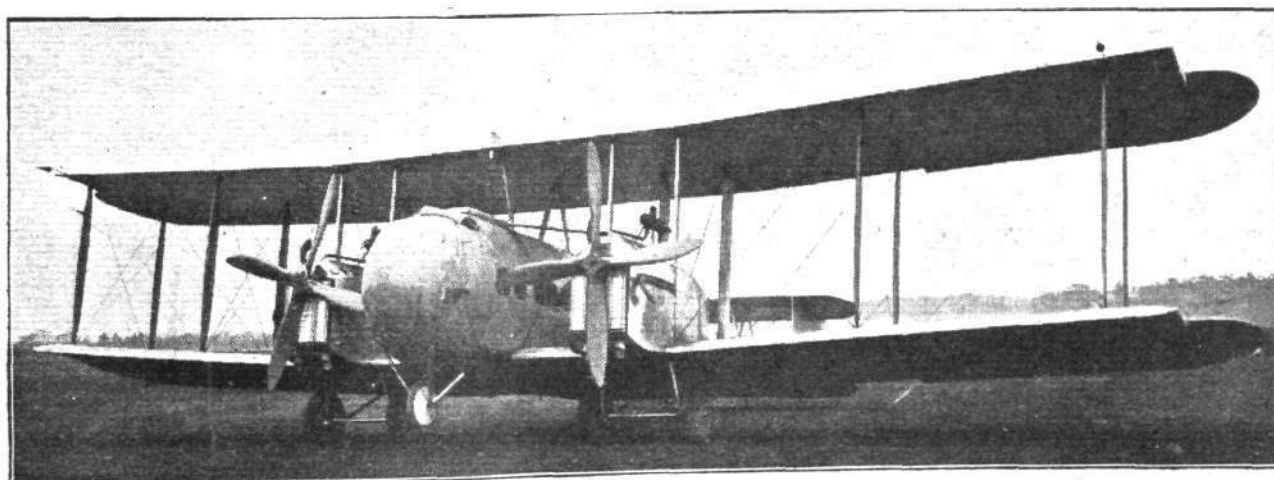
A year or so before the outbreak of war the firm produced a two-seater "pusher" with Gnome engine. This machine was the forerunner of the later famous Vickers "Gun 'Bus."

During the war a great number of types were produced, most famous of which is, perhaps, the Vickers "Vimy," with Rolls-Royce "Eagle" engines. It was on a similar machine that the late Sir John Alcock and Sir Arthur Whitten Brown crossed the Atlantic in 16 hours.

Since the war Mr. Rex Pierson, chief designer of the Vickers Aviation Department, has designed a number of different

A later type is the Vickers "Vulcan," a single-engined tractor biplane with Rolls-Royce "Eagle" engine. This machine carries eight passengers, and is consequently very economical to run. It is also characterised by a very low landing speed, which should make for safety.

Of the military machines produced by Vickers since the war mention may be made of the famous "Viking" amphibian, supplied with either Napier "Lion" engine or Rolls-Royce "Eagle," according to the performance required. In 1920 the "Viking" Mark III won first prize in the Air



The Vickers "Vimy-Commercial," with two Napier "Lion" engines. The "Vernon" troop carrier is very similar in general appearance.

Ministry competition for amphibian machines, and since then the same machine has been used with great success for demonstrating the feasibility of landing on and taking off from rivers in the centres of large towns, such as Paris and London. Thus by using amphibian machines it is possible to save the tedious journey from cities to and from their aerodromes.

The Vickers "Vernon" is a troop carrier generally similar to the "Vimy-Commercial," but as it is built for the Air Ministry it may not be referred to in detail.

For use where the necessary amount of traffic is available Vickers have produced a large twin-engined machine, the "Vanguard," which, with two Napier "Lions," will carry twenty-three passengers at a maximum speed of 109 m.p.h.



The Westland "Weasel," Siddeley "Jaguar" engine.

Founded in 1915 as a separate branch of Petters, Ltd., of Yeovil, by Mr. R. A. Bruce, who is joint managing director of Petters, the Westland Aircraft Works, built a number of machines of different type during the war. Apart from machines built under licence, Mr. Bruce and his chief assistant designer, Mr. A. Davenport, designed several original machines, such as the Westland "Wagtail" and the Westland "Weasel."

All these machines have well-appointed cabins, and a feature of their design is that the pilot is actually seated in a corner of the cabin, partitioned off from it, and with his head projecting through the roof. Thus it is possible for passengers to converse with him to some extent, such as to ask for information relating to places flown over route followed, etc.

Concerning military machines produced since the Armistice,



The Westland "Walrus" is a Fleet Spotter, with Napier "Lion" engine.

Since the war the Westland Aircraft Works have produced both commercial and military machines. Among the former, mention may be made of a small four-passenger commercial machine with Rolls-Royce "Falcon" engine, followed later by a similar machine with Hispano engine, and, finally, the larger six-seater with Napier "Lion" engine, which won the Air Ministry competition at Martlesham (small class) in 1920.

nothing may be said, but we publish herewith a photograph of the Westland "Walrus" fleet spotter, which is fitted with a Napier "Lion" engine.

The superintendent of the Westland Aircraft Works is Captain A. S. Keep, who is also the firm's chief test pilot. Captain Keep piloted the Westland machine to victory in the Air Ministry trials in 1920.

## NEXT YEAR'S AIR CONFERENCE

As on previous occasions, the third Air Conference will be held at the Guildhall on February 6 and 7, 1923, when the proceedings will be opened by the Right Hon. The Lord Mayor of London. The programme will be as follows:—

**Tuesday, February 6.—Morning Session.** Chairman: The Secretary of State for Air (Lieut.-Colonel the Right Hon. Sir S. J. G. Hoare, Bt., C.M.G., M.P.). *Civil Aviation Papers:* "The Position of Air Transport Today," by Maj.-General Sir W. S. Brancker, K.C.B., A.F.C., Director of Civil Aviation; "A Self-supporting Airship Service," by Commander C. D. Burney, C.M.G., M.P.

**Afternoon Session.** Chairman: Sir Henry P. Maybury, K.C.M.G., C.B. *Technical Papers:* "The Progress of Research and Experiment," by Air Vice-Marshal Sir W. G. H. Salmond, K.C.M.G., C.B., D.S.O., Air Member for Supply and Research;

"Gliders and their Value to Aeronautical Progress," by Colonel A. Ogilvie, C.B.E.; "Seaplanes," by Mr. C. R. Fairey, M.B.E.

**Wednesday, February 7.—Morning Session.** Chairman: The Under-Secretary of State for Air (His Grace the Duke of Sutherland). *Civil Aviation.* General discussion on the papers read on the first morning.

**Afternoon Session.** Chairman: The Right Hon. Lord Weir of Eastwood. *Technical.* General discussion on the papers read on the first afternoon.

Synopses of the papers will be issued a few days before the opening of the Conference.

In connection with the Conference, it is hoped to afford opportunity for a visit to the London Terminal Aerodrome at Croydon.

# BRITISH AERO ENGINES

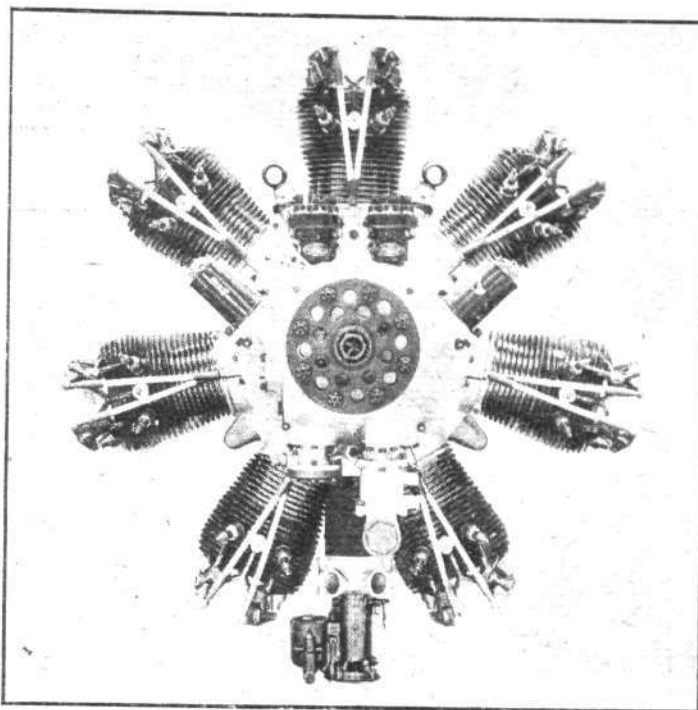
## ARMSTRONG-SIDDELEY ENGINE

THE history of Armstrong-Siddeley Motors, Ltd., of Coventry, has already been briefly sketched under the aircraft section of this issue of *FLIGHT*. Running mainly parallel with this is the history of the engine section, which, like the aircraft department, is allied with the firm of Sir W. G. Armstrong, Whitworth and Co., Ltd. There is this difference, however, that the aero engine section came into being earlier than did the aircraft department, becoming first famous during the War by the production in huge quantities of the Siddeley "Puma" engine. This engine, a six-cylinder vertical, develops 230 to 250 h.p., according to compression, and has established an excellent reputation for reliability. Used during the War in great numbers in the D.H.9 type of aeroplanes, the "Puma" did a tremendous amount of useful work, and since the war the engine has been used in a number of D.H.9's for various purposes. Among the famous flights made by "Puma"-engined machines mention may be made of Mr. Alan Cobham's flights through Europe and northern Africa in de Havilland machines fitted with the "Puma" engine.

Useful as the Siddeley "Puma" has proved itself, it is now gradually being superseded by later Siddeley designs, such as the 350 h.p. Siddeley "Jaguar" 14-cylinder radial air-cooled engine and the 175 h.p. "Lynx," which has cylinders and general parts similar to those of the "Jaguar," but only seven cylinders instead of fourteen.

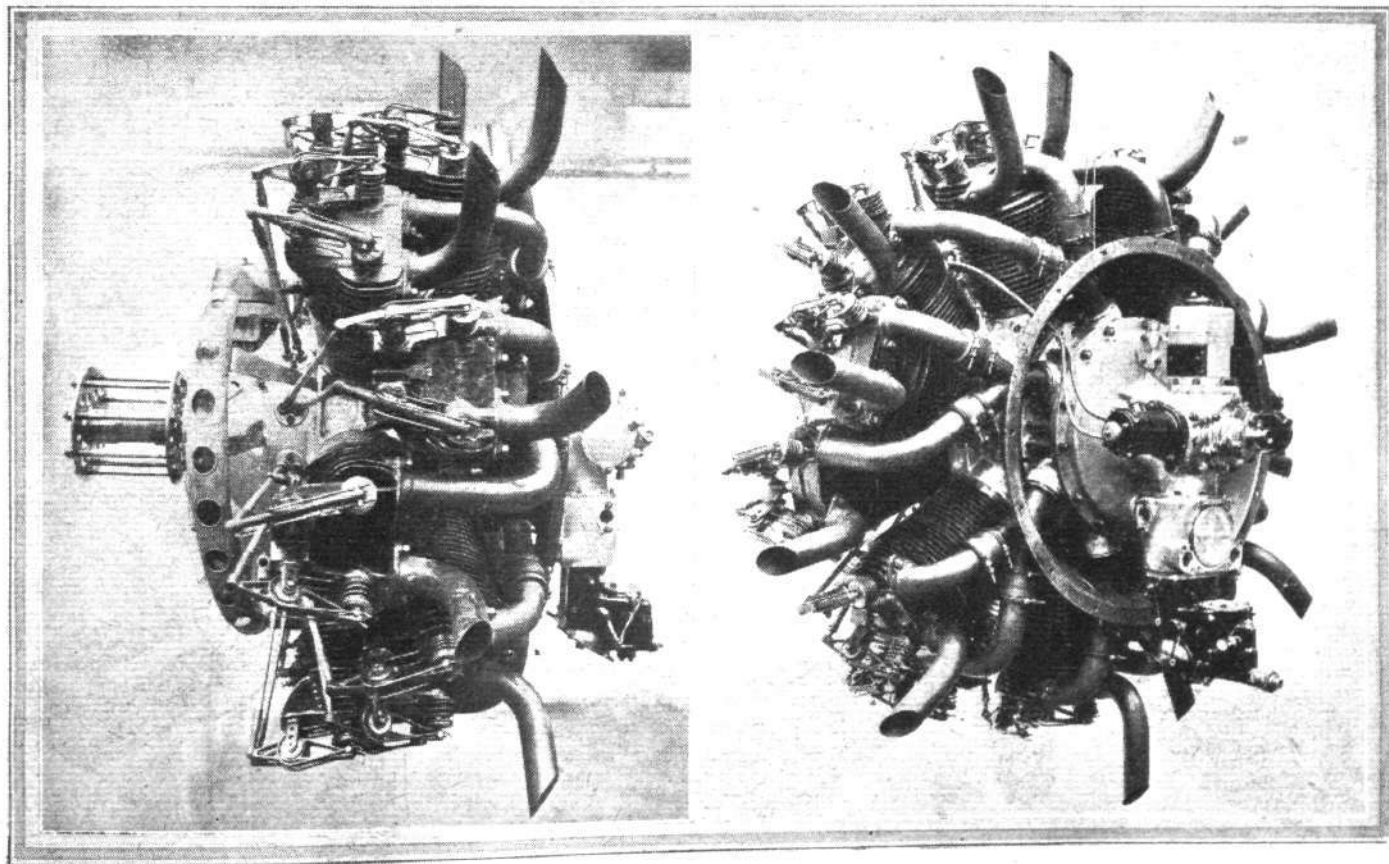
The Siddeley "Jaguar," which has passed the Air Ministry type-tests with flying colours, is now rapidly being introduced into military aeroplanes, although up to the present it has not been installed in any commercial aircraft. With its fourteen cylinders, it has an extremely even torque, and pilots who have flown behind it state that its smooth running is most remarkable. It has been fitted already into a number of machines, among which are the Siddeley "Siskin," the Gloucestershire Aircraft Co.'s Mars VI (which climbs to 20,000 ft. in 18 mins.), and the Westland "Weasel." Other types are now coming along into which the Siddeley "Jaguar" will be fitted, and in aviation circles this engine is regarded by many who are competent to judge as the most promising type of its power.

The "Lynx" is generally similar to the "Jaguar," except that, as already stated, it has but seven cylinders. The



The Armstrong-Siddeley "Lynx" radial air-cooled engine, which develops 175 h.p. at 1,700 r.p.m. It follows the same general design as the Jaguar, but has only seven cylinders.

power developed is 175 h.p., and for low-powered military machines where a light engine is required the "Lynx" supplies the want of an engine between 150 h.p. and 200 h.p. Its general design is clearly shown in the photograph which we reproduce above.



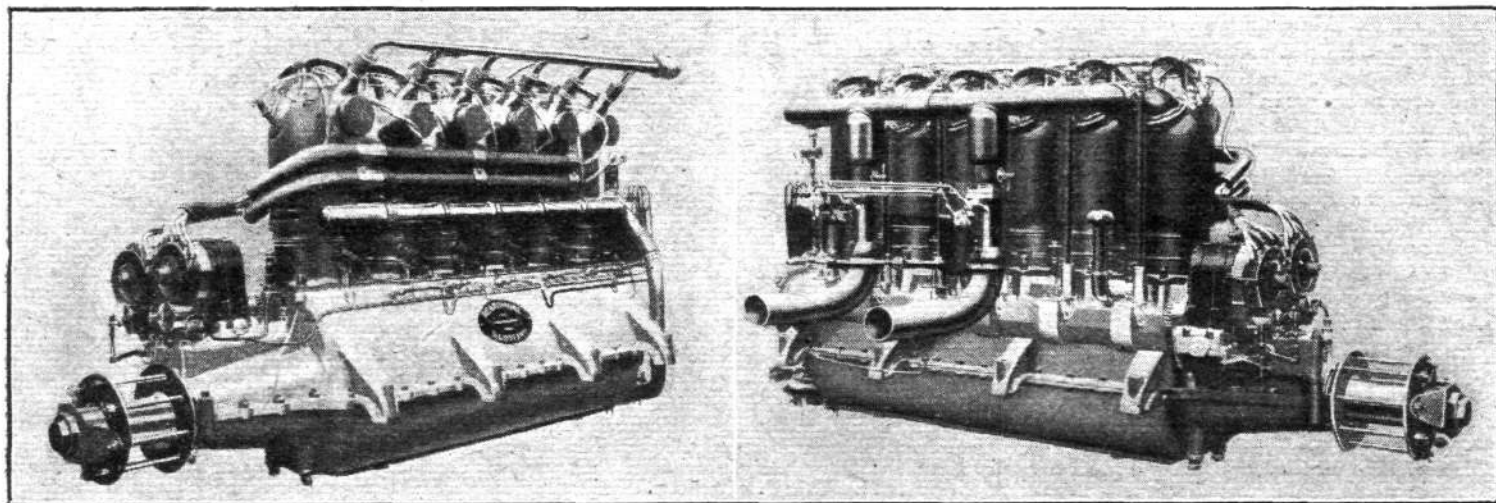
Two views of the 350 h.p. Armstrong-Siddeley "Jaguar" aero engine.

## THE BEARDMORE AERO ENGINES

During the war some 3,000 Beardmore aero engines were produced and supplied to the British Government. After the war all the engines with corresponding numbers of spares, left over as Government surplus were bought back by the manufactureres, with the result that Wm. Beardmore and Co. are now in a position to supply from stock complete engines and spares at the shortest possible notice. The Beardmore engines, notably the 160 h.p. size, have a reputation for reliability, although they are not as light per horse-power as some modern engines. On the other hand, they are sturdily

type sufficiently to make it suitable for aircraft work, but Messrs. Wm. Beardmore, Ltd., think otherwise, and from what can be gathered they appear to have advanced a long step towards the production of a heavy oil engine the weight of which is not prohibitive for aviation purposes.

Naturally enough, considerable secrecy surrounds this latest Beardmore product, but it will easily be realised that if such an engine prove a practical proposition, it will go a long way towards making flying safe and economical. The fuel consumption of heavy-oil engines is low (per horse-power



Two Views of the 160 h.p. Beardmore aero engine.

built, and are economical in fuel and oil consumption. The engine is already well known and requires no description here.

Mr. Alan Chorlton, chief designer of Beardmore Aero Engines, has during the last year or so been busily engaged upon the production of an engine of entirely novel type, as far as aero engines are concerned. The subject of the latest experiments is a semi-Diesel type, designed to burn heavy oil in place of petrol. It has been thought by many that it was not yet possible to reduce the weight of an engine of this

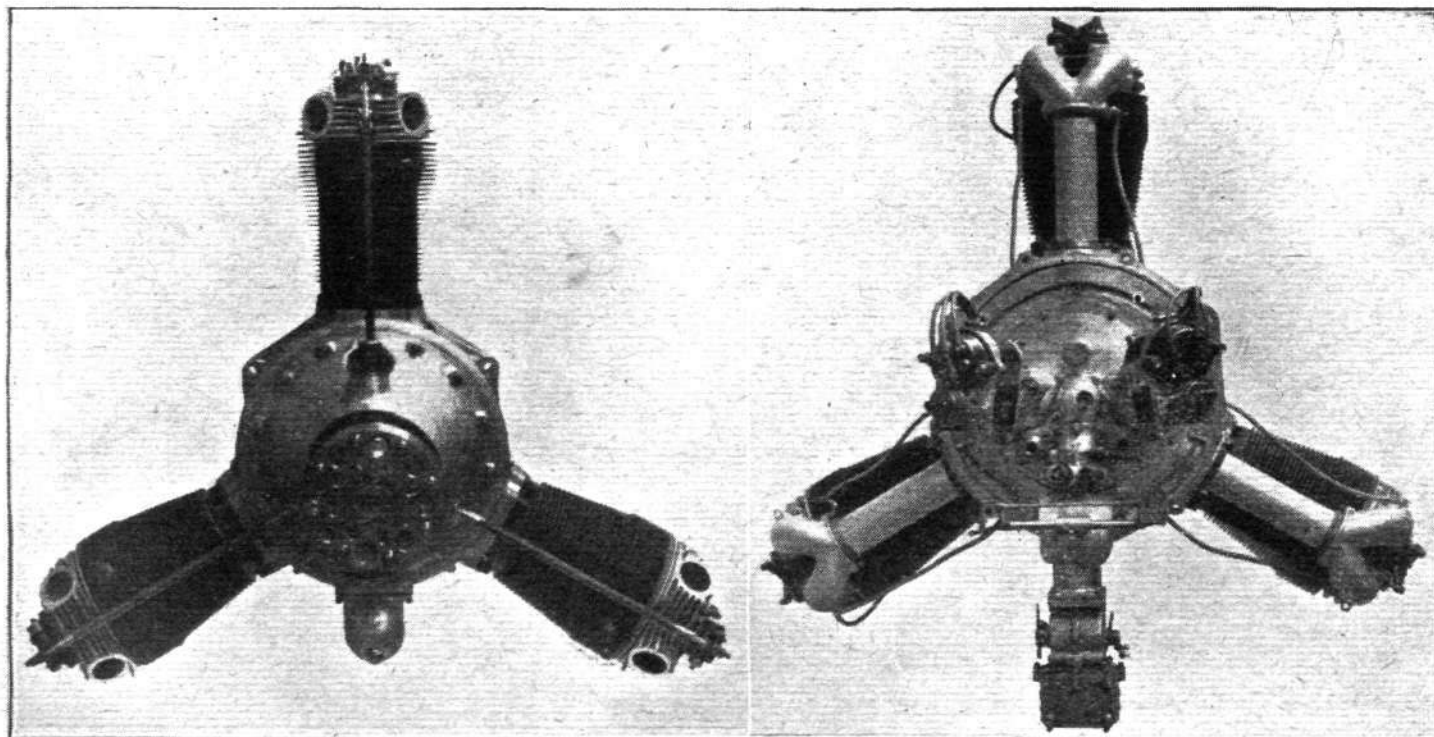
developed), and the cost of the heavier oil is lower than that of petrol. A further very great advantage is that the risk of fire is considerably lessened, while the high-compression engine retains its power better at great altitudes than does the petrol engine of normal compression.

The development of the Beardmore semi-Diesel aero engine will therefore be watched with more than ordinary interest, and if the difficulties can be overcome its production will mean a great step forward in aircraft development.

## THE "BRISTOL" AERO ENGINES

Although the Bristol engines are a somewhat late development of the Bristol Aeroplane Co., Ltd., whose other activities

have been dealt with elsewhere in this issue, they have already made quite a fine reputation for themselves. It may be



Two views of the Bristol "Lucifer" 100 h.p. engine.

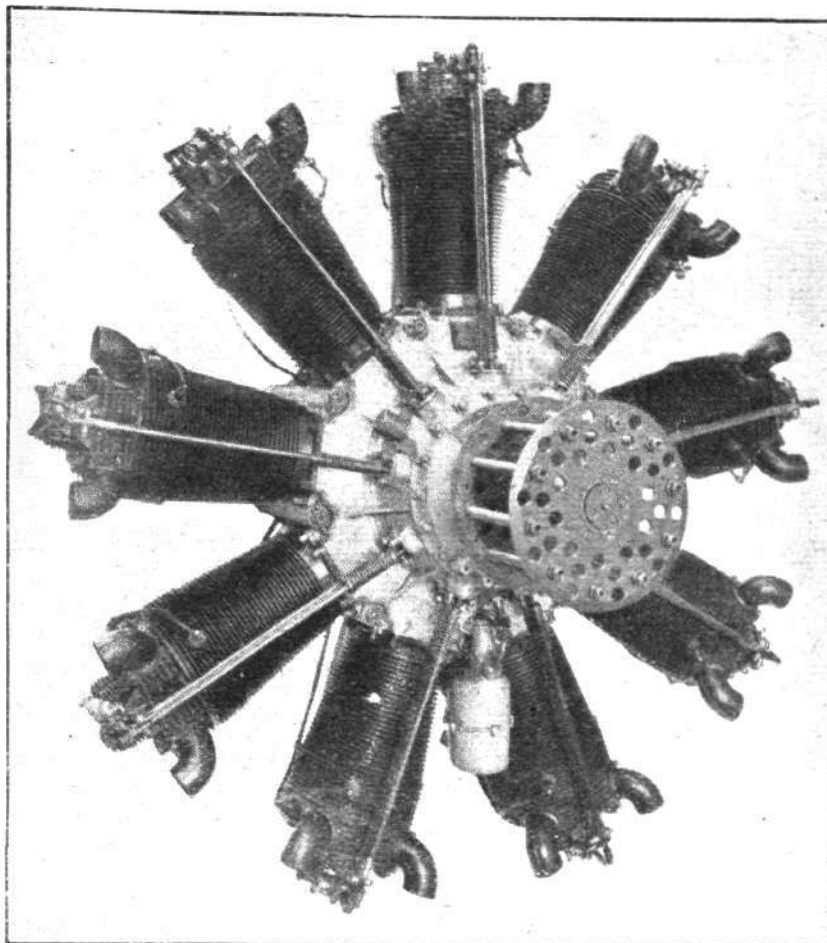
recalled that the "Jupiter" and "Lucifer" aero engines were produced by the Cosmos Engineering Co. of Bristol, chief designer of which was Mr. Roy Fedden. When the Cosmos company closed down, the patent rights for these engines were acquired by the



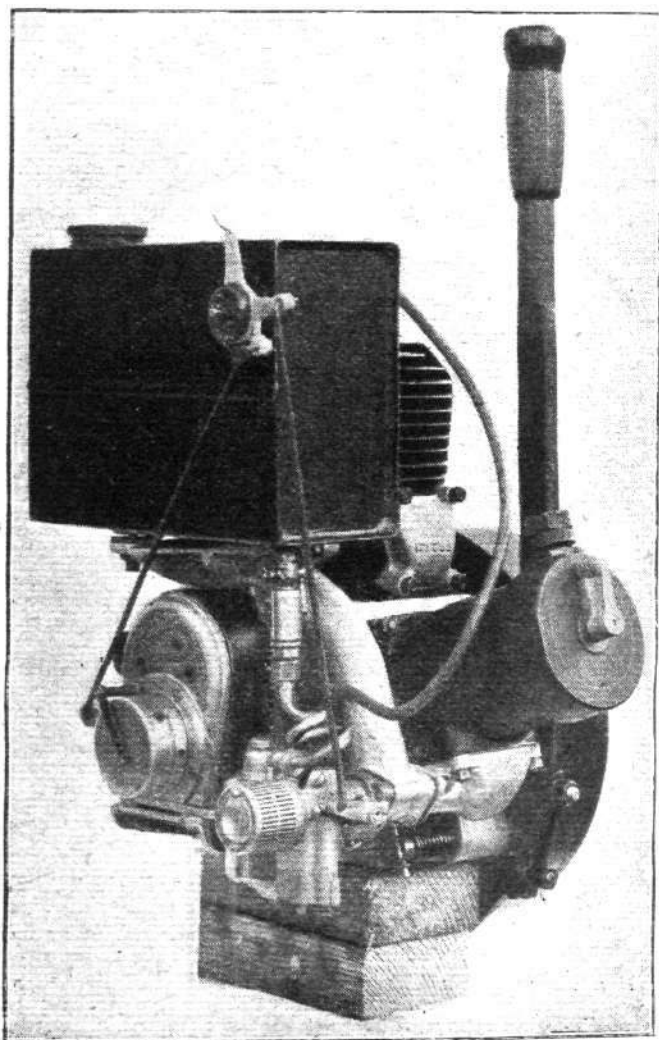
Roy Fedden, Chief Designer.

Bristol Aeroplane Co., of Filton, Bristol, and Mr. Fedden transferred his services to the latter firm, whose chief engine designer he now is.

Since being taken over by the Bristol Aeroplane Co. the "Jupiter" and "Lucifer" engines have been further developed and improved, and have now proved themselves thoroughly. The "Jupiter" of 400 h.p. has passed both the British Air Ministry type-tests and the French tests imposed by the



Three-quarter front view of the Bristol "Jupiter" aero engine.



The "Bristol" engine-starter is made as a complete unit.

*Section Technique*, and recently arrangements have been completed for manufacturing the Bristol engines in France (by Gnome and le Rhone Co.), which is somewhat reversing the old order of things.

The 400 h.p. "Jupiter" has been fitted in a number of British machines, among which are the "Bristol" 10-seater commercial biplane, the "Bristol" racing monoplane, the "Bristol" "Bullfinch," the Handley Page W.8, the new Short all-metal machine and others. Light weight and low petrol consumption are features of both the "Jupiter" and "Lucifer" engines, while the relatively small number of cylinders results in having few moving parts, few valves and sparking plugs to renew, and generally easy and cheap upkeep—each of them qualifications which make a very strong appeal to those who are considering the utilization of aircraft for commercial purposes. The characteristic features of both this engine and the smaller "Lucifer" type are clearly shown in our photographs on this and the previous pages.

The "Bristol" "Lucifer," of 100 h.p., has been fitted in the Bristol monoplane, the Avro 504, and, recently, in the new "Bristol" three-seater, which but for lack of a suitable stand would have been exhibited at the present Paris Aero Show.

A feature of both "Bristol" engines is the swivelling engine-plate mounting by means of which the back of the engine is easily accessible for inspection, cleaning or repairs. The whole engine plate is mounted on hinges on one side, and, after undoing two pins, the engine can be swung forward and outward, when the whole back of the engine is within reach of a mechanic standing on the ground.

The Bristol Aeroplane Co. have also produced a very neat little gas starter for aero engines, consisting of a small air-cooled petrol engine with a pumping cylinder supplying combustible mixture, through a series of pipes, to all the cylinders of the main engine. The starter is designed as a complete unit, and weighs but 40 lbs. It will start from cold any aero engine up to about 400 h.p. in a few seconds.

A great advantage of this type of starter is that it can be placed anywhere in the aircraft, within convenient reach of the pilot, and can be used to start both engines of a twin-engined machine. For commercial aircraft it is often of great advantage for the pilot to be able to re-start his engine after a forced landing *en route* without calling upon the local inhabitants, if any, for assistance.



**G. Green, Designer.**

THE  
GREEN ENGINE  
CO., LTD.



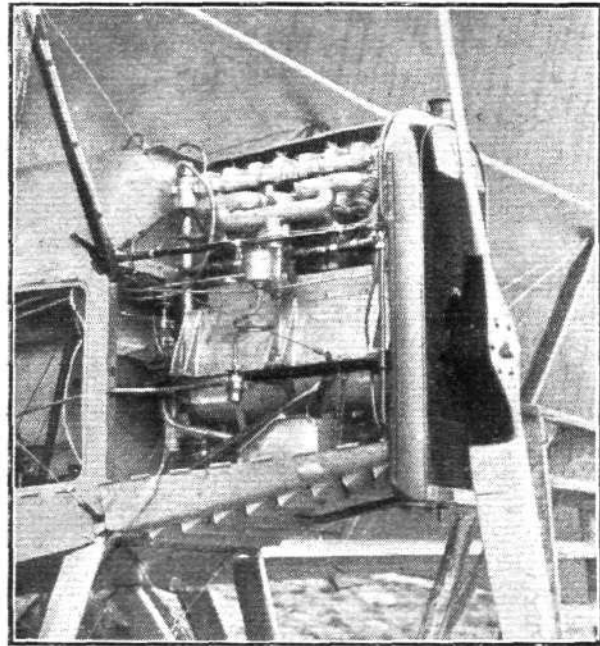
Fred May, Managing Director.

As the pioneer British aero engine firm, the Green Engine Co., of 166, Piccadilly, London, W. 1, occupies a unique position. The first Green aero engine was heard of as early as 1909, while several years before the War a Green engine won the Patrick Alexander Prize. Early Green engines were fitted in such pioneer aeroplanes as the Avro biplanes at Brooklands in 1911 and in the Cody biplanes from about 1910 to the untimely death of that aviation pioneer.

During the War the Green Engine Co. made large numbers of engines for aircraft, both heavier and lighter than air, and Green engines are also extensively used in motor vessels of various sorts, and they did very fine work in coastal motor-boat during the war.

Of recent years the model which has come most prominently before the public is the small 35 h.p. engine with which Bert Hinkler, on the Avro "Baby," made his famous non-stop flights from London to Turin, and from Sydney to Bundaberg in Australia and also put up most striking performances in the post-war Aerial Derby races and other chief events of a competitive character.

This wonderful little engine is practically identical in general design with the early engine on which Brooklands pilots used to rely in 1911 and thereabout, with the exception that aluminium pistons have been fitted. Although not a "featherweight" engine, the 35-40 h.p. Green weighs 185 lbs. ; it makes up for its weight by reliability and freedom from breakdown and by its low fuel and oil consumption, the former being 0.58 pint per h.p.-hour and the latter 0.10 pint per h.p.-hour.



**The 35 h.p. Green Engine Mounted in an "Avro Baby."**



**M. S. Napier, Director, and  
responsible for design.**

D. NAPIER,  
AND SON, LTD.

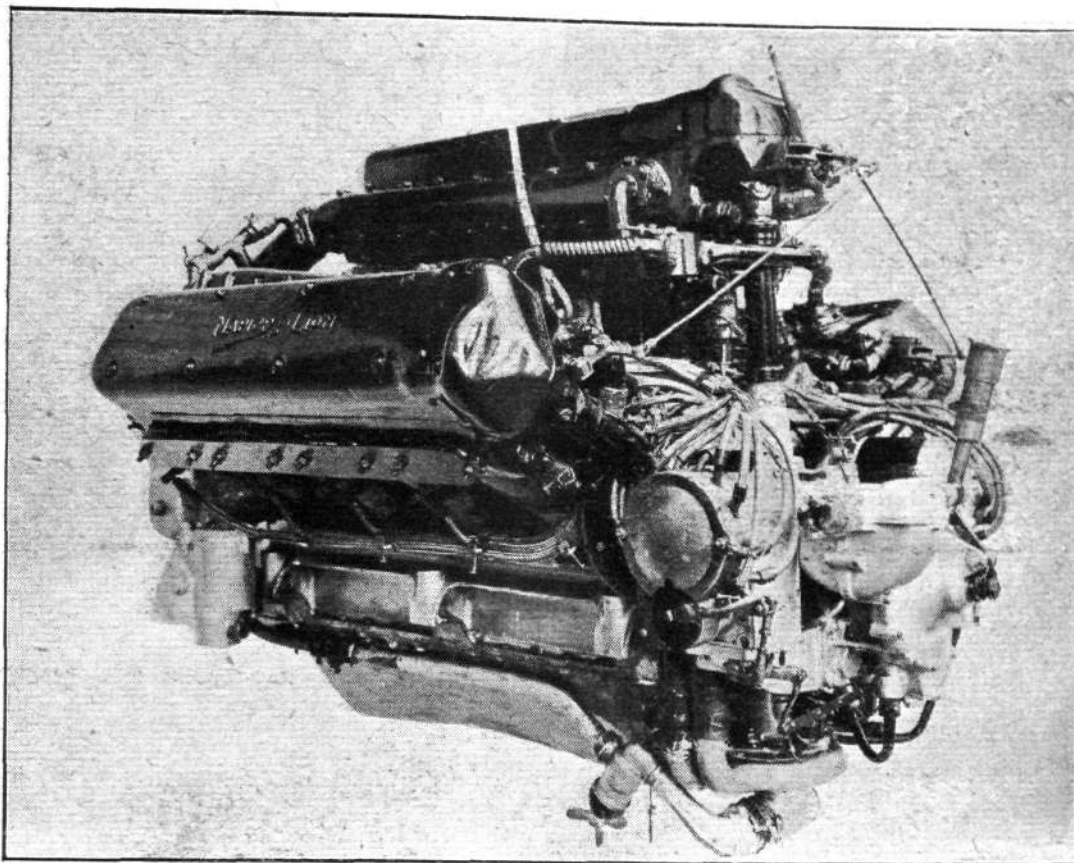


H. T. Vane, Managing  
Director.

The first Napier internal combustion engine was produced in 1899, and in the automobile branch of D. Napier and Son, Ltd., the development has been one of steady progress. The Napier company first turned their attention to aircraft and aero engines in the early days of the War. Already in 1914 designs were being prepared, but owing to the attitude of the Government of that time it was not until 1918 that the firm was allowed to proceed with the construction of an engine, and the first Napier "Lion" made its appearance in January of 1919. Almost on its very first flight this engine

achieved fame, when Capt. Lang, flying a D.H. "Airco" with the "Lion," reached an altitude of 30,500 ft.

Ever since, the history of the Napier "Lion" is an uninterrupted record of successes, among which space permits only of mentioning a very few. Thus in the Air Ministry Competition of 1920 the Napier "Lion" was fitted in the machines obtaining the highest prizes in each of the three classes. The "Lion" engine also has been fitted in the record-breaking "Mars I." It is also a noteworthy fact that the Supermarine "Sea Lion" which Biard piloted

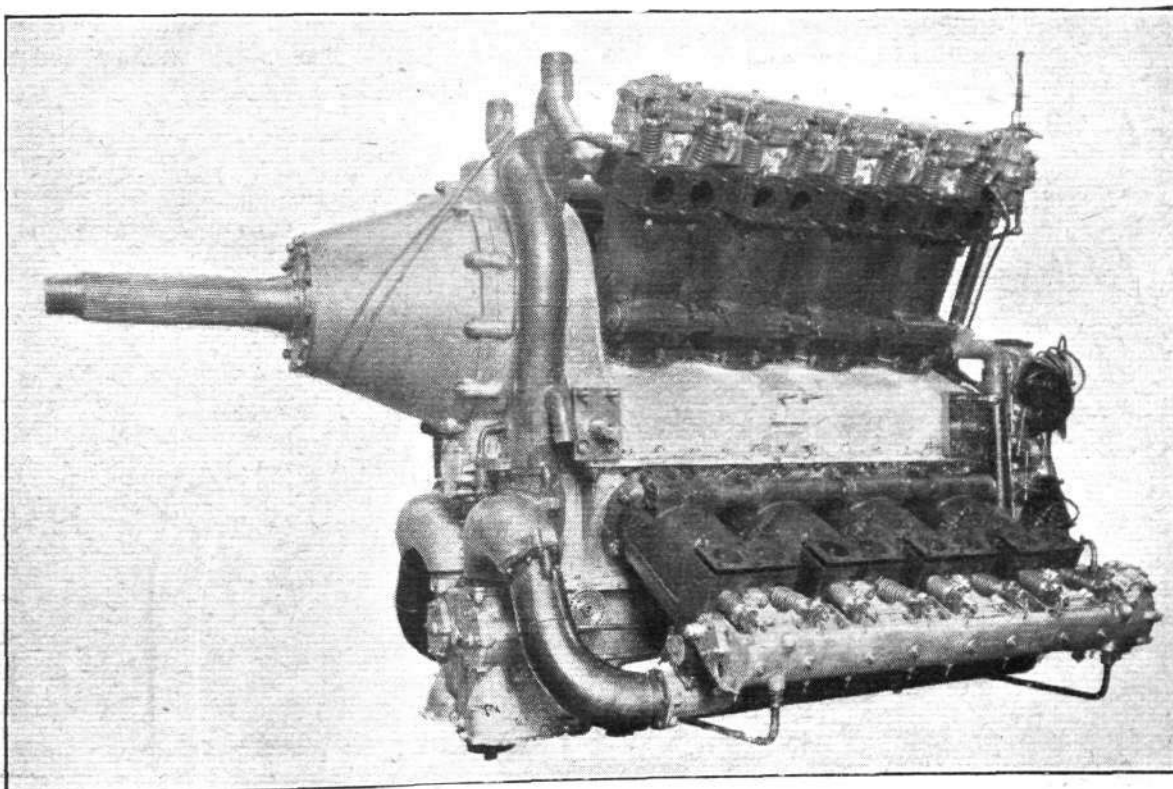


The 450 h.p. Napier "Lion" aero engine.

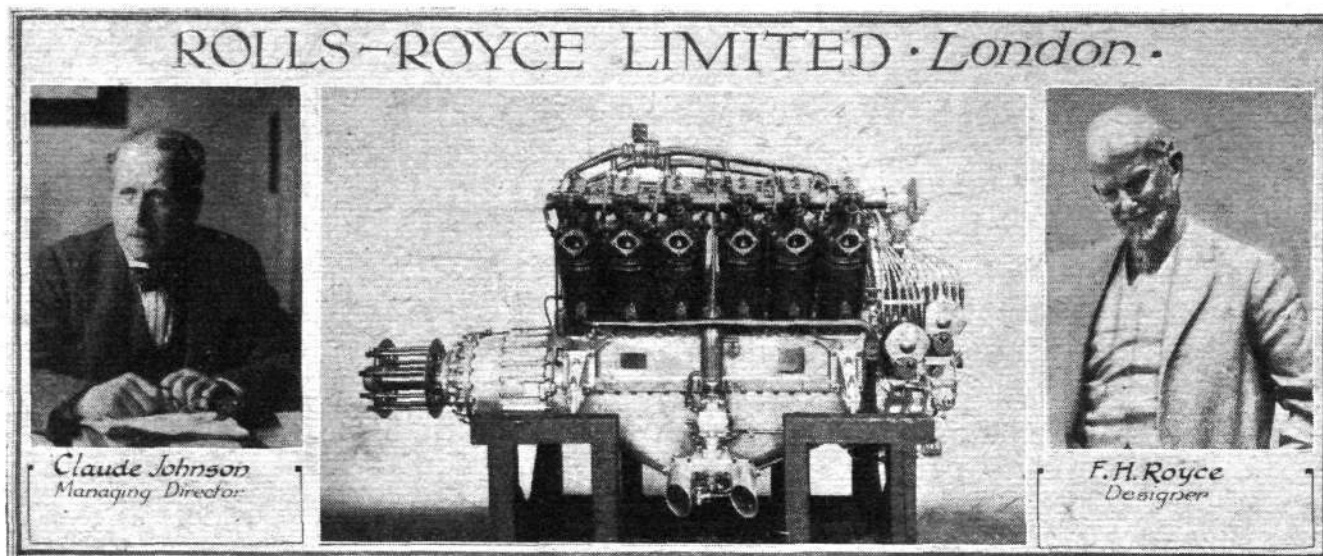
to victory in the Schneider Cup race at Venice this year was fitted with a "Lion" engine. On the score of reliability the Napier "Lion" also has some remarkable performances to its credit. Thus it may be remembered that an Alliance biplane made a non-stop flight from London to Madrid, a distance of 900 miles, in  $7\frac{1}{2}$  hours, while recently, in a D.H. 34 commercial biplane, one of these engines ran for 200 flying hours without overhaul.

Not content with the excellent reputation—world-wide at that—established by the "Lion," Mr. Napier and Mr. H. T. Vane, managing director of the firm, pursued their vigorous development policy and produced, about a year ago, one of

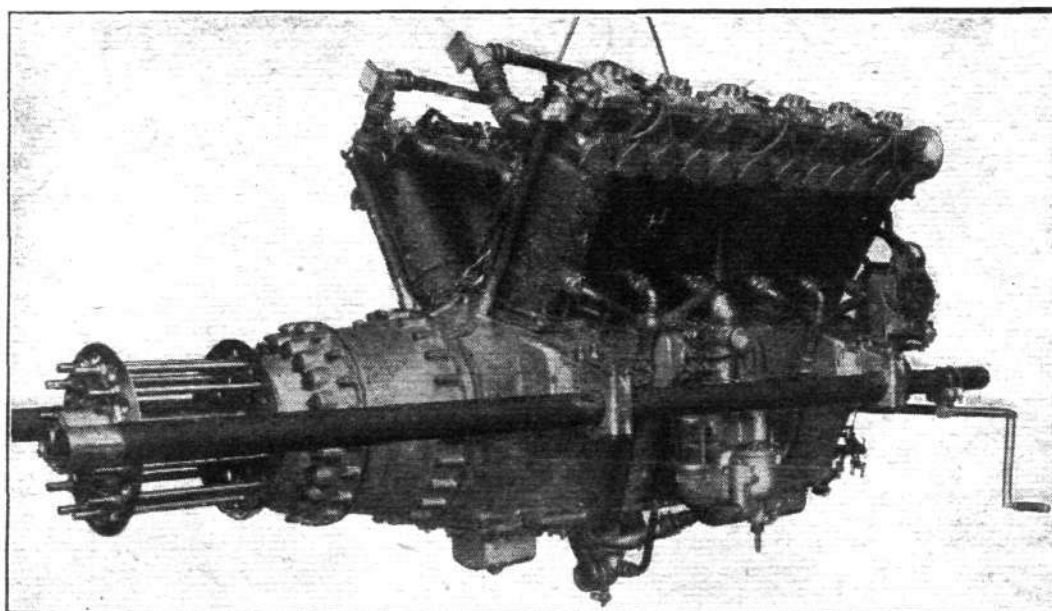
the most remarkable aero engines ever turned out, *i.e.*, the 1,000 h.p. Napier "Cub." This engine has not yet had an opportunity of proving itself to the same extent as has the "Lion," but it has now been fitted in one of the Avro "Aldershot" machines, and within the next few weeks it is hoped to carry out extensive flying tests. On the test bench the "Cub" has proved very satisfactory, and there is no reason to suppose that it will not prove as successful in the air as has the smaller "Lion." Of "X" formation, the 16-cylinder "Cub" is very compact for its size, and already designs are contemplated by various aircraft manufacturers for utilising the most powerful aero engine in the world.



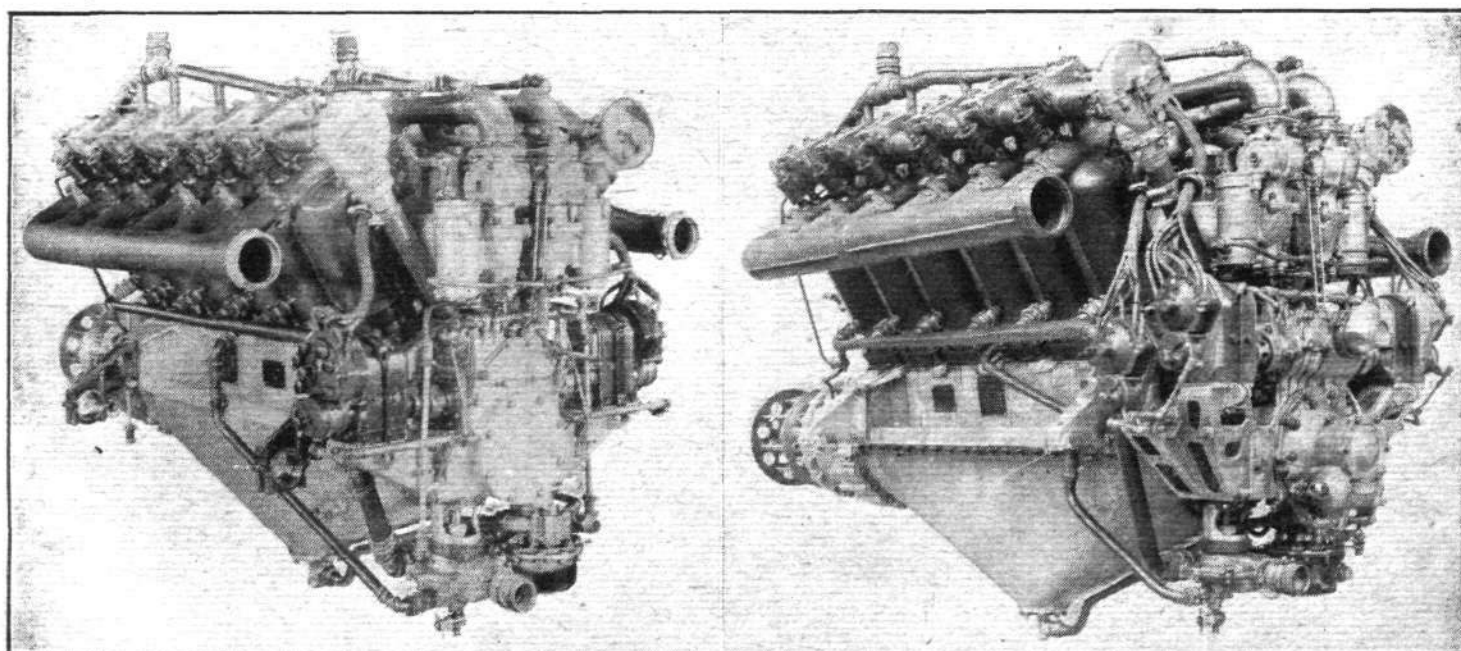
The 1,000 h.p. Napier "Cub" aero engine.



Side View of the New Rolls-Royce "Eagle IX."



The 600 h.p. Rolls-Royce "Condor," which has been fitted in the De Havilland "Derby" and Avro "Aldershot."



TWO ROLLS-ROYCE AERO ENGINES : On the left the 275 h.p. "Falcon," and on the right the 360 h.p. "Eagle."

For a great number of years Rolls-Royce, Ltd., have held a leading place in the automobile world, and during the War the firm undertook the development of aero engines with the idea of establishing a similar reputation in that branch. With what success this task was undertaken is now familiar to readers of this journal all over the world, the Rolls-Royce engines having done an enormous amount of war service as well as having to their credit some of the most remarkable flights since the cessation of hostilities.

Probably the first aeroplane into which the Rolls-Royce "Eagle" was fitted was the early Handley Page o-400 bomber, and since that time this type has been used in a variety of machines, to enumerate which would take up more space than we have available in this issue.

The smaller size, the 275 h.p. "Falcon," is as reliable as its bigger brother the "Eagle," but owing to its smaller power it has not had such general application. Lately, however, it has been fitted in the fast touring machine built by the de Havilland Aircraft Co. for Mr. A. S. Butler.

The largest of the Rolls-Royce family is the 680 h.p. "Condor," which resembles in general lay-out the smaller models. This engine has been fitted recently in such machines as the Avro "Aldershot," the Short "Cromarty" and the de Havilland "Derby."

Among the many famous flights made by Rolls-Royce engines may be mentioned the transatlantic flight by the late Sir John Alcock and Sir Arthur Whitten Brown in the Vickers "Vimy," the London to Australia by the late Sir Ross Smith and Sir Keith Smith, also on a "Vimy," and the Cairo to Cape Town flight.

A recent model introduced by Rolls-Royce, Ltd., is the "Eagle IX," which is generally similar to the famous "Eagle VIII" but differs from that type in certain details. The new model has been designed to be equally suitable for peace and war purposes, and to that end the following improvements have been effected:—Two carburettors are fitted instead of four, so that tuning is considerably facilitated. The placing of the carburettors low down allows of using direct-gravity feed, the float feeds having been re-designed. The engine will now function satisfactorily with a "head" of only 8 ins. above the centre-line of the crankshaft. In

view of the tendency in modern commercial aircraft of employing direct-gravity petrol feed from the main tanks in order to avoid pumps, piping, etc.), this should be a great advantage, and should help to ensure for the "Eagle IX" as great popularity as that enjoyed by the previous model.

While on the subject of Rolls-Royce engines it should be mentioned that Mr. J. Rowledge, who had a large share in



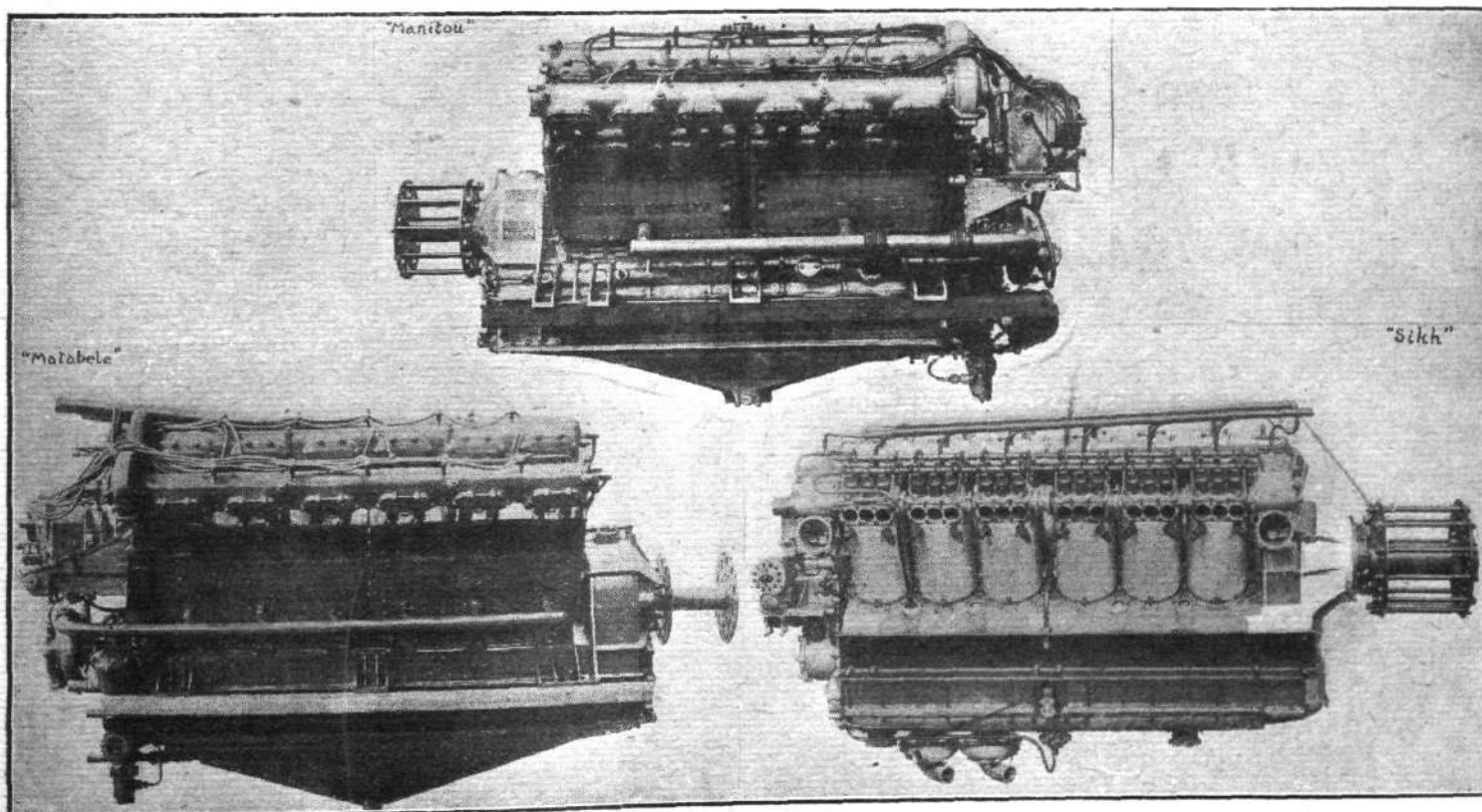
J. Rowledge.

the design of the Napier "Lion" and "Cub" engines, has now joined Rolls-Royce, Ltd., to assist Mr. F. H. Royce in dealing with aero engine design. The combined experience of these two expert designers should result in some very interesting engines during the next few years.

## THE SUNBEAM AERO ENGINES

The earliest association of the Sunbeam Motor-Car Co., Ltd., of Wolverhampton, with aviation was towards the latter end of 1912, when an eight-cylinder side-valve engine, of 150 h.p., of the type known as the "Crusader," was produced. It must be remembered that this was in the early days of

the industry, when little or no encouragement was forthcoming, and consequently the company showed considerable initiative in themselves purchasing a Henry Farman biplane of early type and experimenting with their own engines installed in same, piloted by the late Sir John Alcock.



THREE SUNBEAM ENGINES : Above, the 300 h.p. "Manitou." On the left, the 400 h.p. "Matabele," and on the right, the 800 h.p. "Sikh."

The development of aviation was early foreseen by the company, and the value of their three years' experimental work was evident when the War broke out, for at that time the Sunbeam Company were one of the very few firms which had ready, standardised and in production, aircraft motors of sufficient power to raise and propel seaplanes.

From this time forward the company never looked back, and with the full concurrence of the Admiralty, War Office and Air Ministry it evolved and produced a wider range of aircraft power plant than any other firm in the country, and these were supplied not only to the British Government, but, in the early days of the War, to the Russian Government and also to the French War Office and the French Ministry of Marine for use in the large seaplanes which carried out patrol work on the Mediterranean coast. Some of the original engines are still in use in these French seaplanes.

Sunbeam engines were associated with a number of picturesque incidents, not the least prominent being at the Battle of Jutland, where Sunbeam-Coatalen engined aircraft gave accurate information to Admiral Jellicoe, and also at the siege of Kut, where a number of seaplanes, equipped with 12-cylinder side-valve "Mohawk" engines of 275 h.p., carried flour and other provisions to the besieged garrison.

Shortly after the outbreak of war the introduction of the overhead-valve system had the effect of very much increasing the efficiency of the Sunbeam-Coatalen aircraft engines, and it was eventually with engines of this type that the British airship "R.34" made its wonderful flight across the Atlantic and back again in July, 1919. Those in charge had nothing but praise for the engines, which were of the "Maori" type, with 12 cylinders in "V" formation, each engine developing 275 h.p.

Other well-known engines have been the "Cossack" 350 h.p., which, in a slightly modified form to render them suitable for airship work, were fitted to all the later British rigid airships, the "Matabele" 400 h.p., and the "Dyak" six-cylinder in line vertical engine, developing 100 h.p. This latter, in addition to being largely employed in "Blimps" during the War, has been in use by the Japanese Navy in some of its airships, and also fitted to a number of Avro machines, in which it has been very successful, particularly in Australia and Norway.

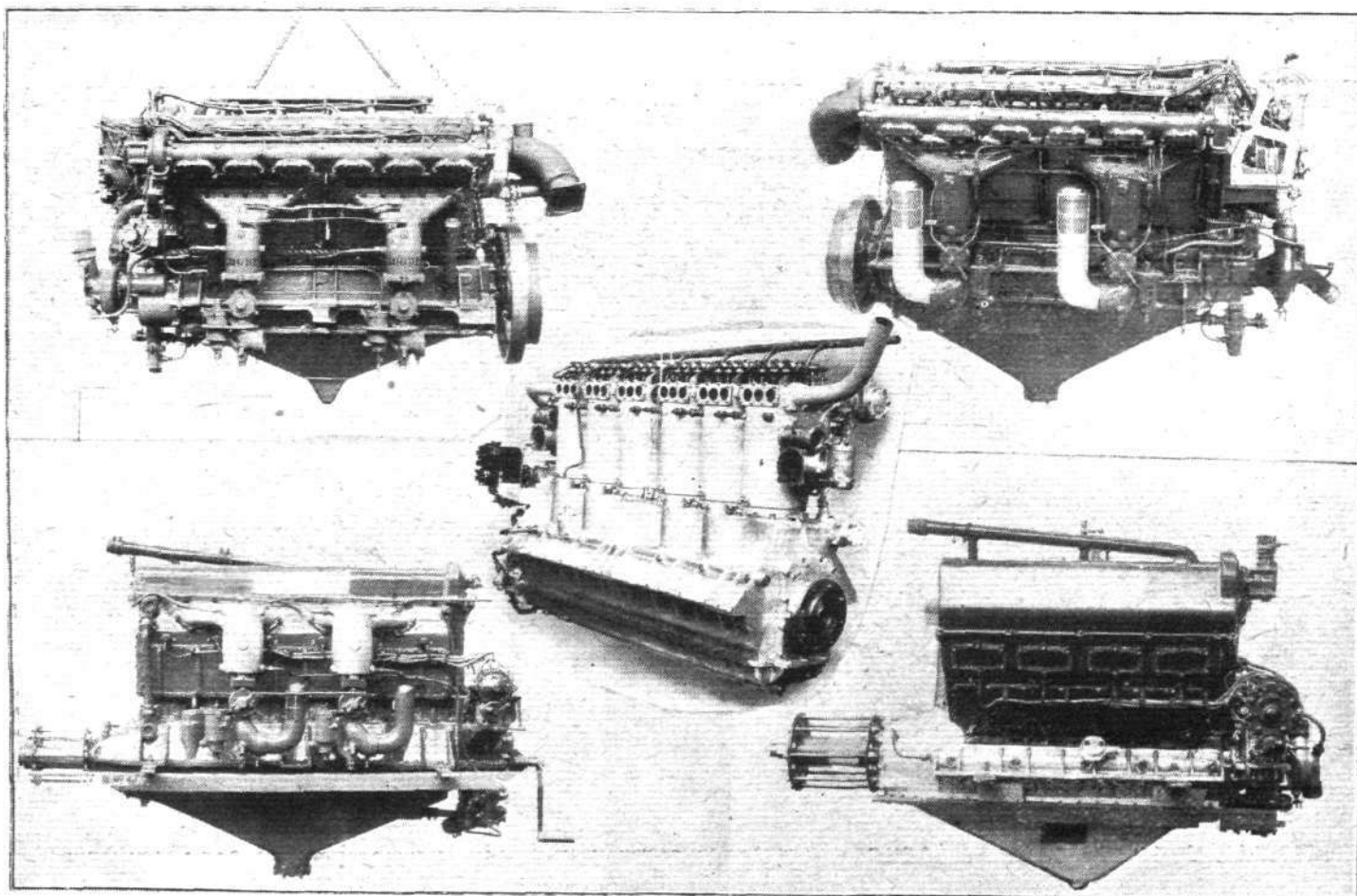
It is to the chief engineer of the Sunbeam Motor-Car Co., Ltd., Mr. L. Coatalen, that the evolution of all these varied types of aircraft engines is due; the company is still engaged

in the development of different types of aircraft engines, and experiments are being made with the "Sikh" 12-cylinder "V" engine, with separate cylinders, developing 1,000 h.p.



L. Coatalen, designer of the Sunbeam aero engines.

It may not be out of place to refer also to the fact that "Matabele" engines have been largely adapted for hydroplanes, and motor boats.



FIVE SUNBEAM ENGINES : Top left, the 275 h.p. "Maori." Top right, the 350 h.p. "Cossack." Centre, the 400 h.p. "Sikh." Bottom left, the 100 h.p. "Dyak." Bottom right, the 200 h.p. "Arab."

## BRITISH AERO ACCESSORIES

### The Aerograph Co., Ltd.

43, Holborn Viaduct, London, E.C. 1.

THIS firm, who are pioneers in the spraying method of applying paints, have specialised in the aviation side of this class of work, and have produced several successful plants suitable for the various requirements of aircraft painting, varnishing and doping, etc. This method of applying paint and the like not only has the advantage of saving labour and time, but it enables the job to be executed with remarkable control—as compared with the ordinary brush method—with the result that the paint, etc., is applied evenly and continuously. Furthermore, it does not drag the surface of the object under treatment, which in certain cases is of considerable advantage. Last but not least, it is economic with the medium. We understand that a new and improved device is being developed by this firm, about which we hope to have something to say very soon.

### The Anglo-American Oil Co., Ltd. (Pratt's).

Queen Anne's Gate, London, S.W. 1.

FIRMS such as the above are always at a disadvantage in a *résumé* of the kind herewith presented, for there is so little one can say about their products in the way of a description, neither can they be illustrated very well! However, the Anglo-American Co.'s well-known "Pratt's" aviation petrol hardly needs any introduction to our readers, for besides being known throughout the world, it is *used* as well. This firm also specialises in bulk storage outfits, consisting of underground storage tanks connected up with self-measuring pumps.

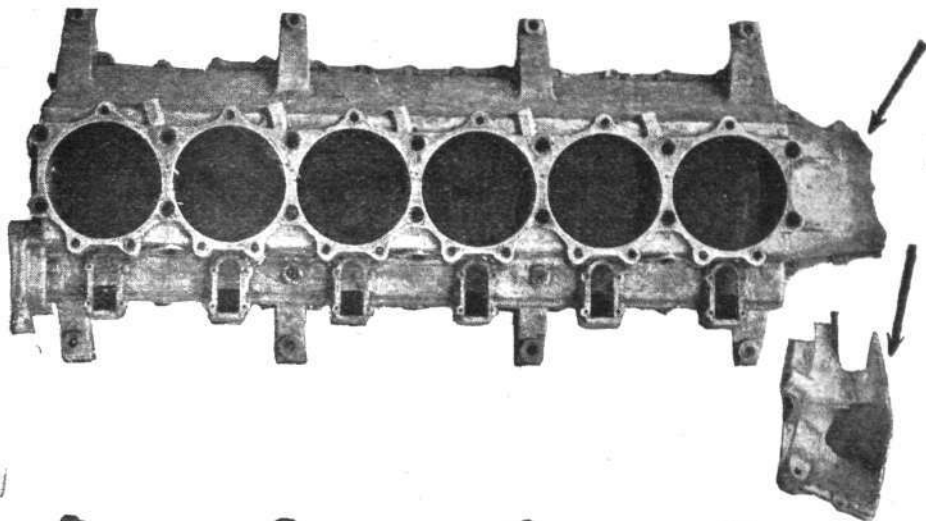
### Auster, Ltd.

133, Long Acre, London, W.C. 2, and Birmingham.

The well-known makers of wind-shields and motor-body accessories are also the manufacturers of the

celebrated Auster-Triplex and Auster-Nonflam aero wind-shields, which during the Great War were adopted as the standard fitment to practically all makes of aeroplanes, seaplanes, kite-balloons, etc. These windshields

idea of the different patterns that can be supplied. Auster, Ltd., will, however, be pleased to submit drawings and quote against specification for wind-shields for all types of commercial aircraft, etc.



A Barimar Repair. Above, a damaged aero engine crank-case, some broken parts missing. Below, the same crank-case mended, with the missing pieces replaced and welded into position.

are made in a great variety of models to suit the different types of aircraft. Unfortunately, space will not permit a description of these here, but we illustrate a few of these to give an

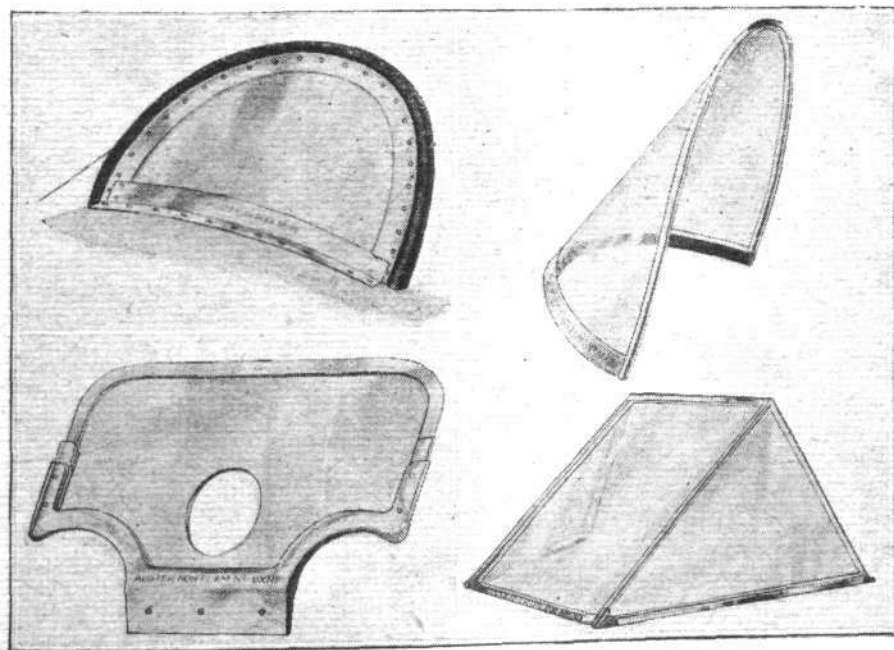
### Barimar, Ltd.,

10, Poland Street, London, W. 1.

SCIENTIFIC welding has played a great part in the construction and repair of aero engines and engine parts. Barimar, Ltd., the scientific welding engineers, of 10, Poland Street, London, W. 1, and branches, have on their books the record of many different makes of aero engine parts which have been successfully repaired by them. The Barimar special process for welding aluminium is invaluable for this class of repair work, as aluminium is used so extensively in the construction of aero engines. Two illustrations are shown of a typical example of Barimar craftsmanship—an aero engine crank-case, before and after repair.

### The British Thomson-Houston Co., Ltd., Rugby.

THE British Thomson-Houston Co., Ltd., started manufacturing magnetos in the very early days of the War, producing magnetos for aircraft, motor-vehicles and motor-cycles, but eventually decided to concentrate solely on the production of aircraft magnetos for four, six, and eight-cylinder engines. Much trouble was experienced at this time, due to the fact that a large proportion of the materials used in the construction of magnetos had only been produced previously in Germany. Magnet steel, moulded insulation, and

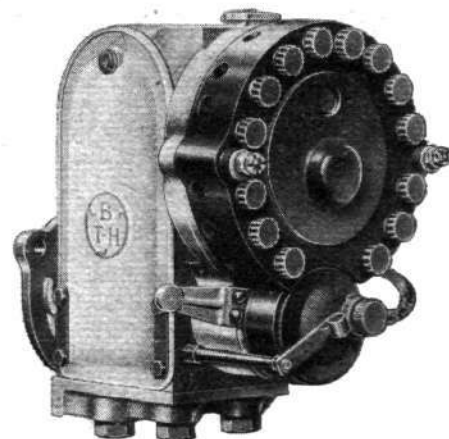
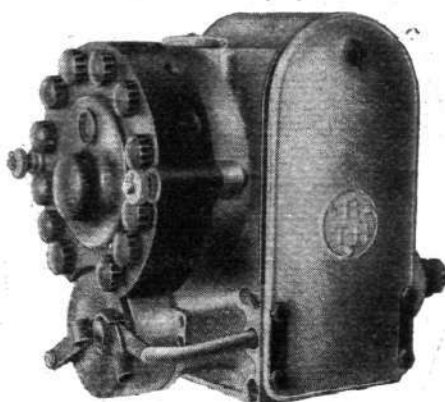
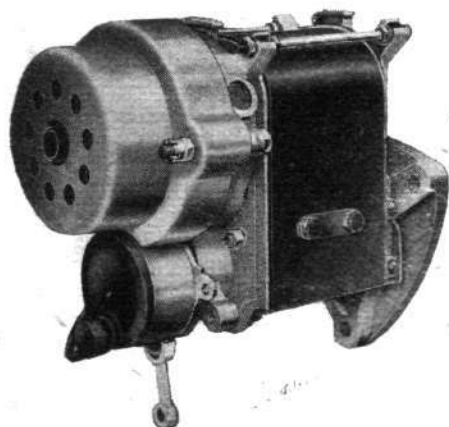


Four patterns of Auster Aero Wind-Shields, specially designed to suit various types of aircraft.

many other materials were unobtainable in this country, and it was, therefore, not only a question of manufacturing magnetos, but also of finding firms who would undertake the manufacture of suitable materials, or for this company to manufacture the materials in addition to the magnetos,

A rotating metal brush is used in conjunction with raised distributor segments, and, in addition to eliminating the leakage due to the rubbing action of the old type of carbon brush, this distributor ensures that the current is retained until sufficiently intense to spark across a leaky or sooty plug.

equipment, contains numerous useful British Standard and Air Board specifications. We understand copies of this catalogue are available for Government Air Departments and aircraft contractors. In addition to specialising in A.G.S. material, Brown Bros., Ltd., are prepared to supply



Three B.T.H. Aero Magnetos, from left to right, the A.O. 9, A.V. 12 and A.V. 14

the latter course being the only one open in many cases. Under these great difficulties the manufacture of magnetos was started within the first two weeks of the War, and, as little was known about magneto design in this country at that date, it was only natural that the first magnetos manufactured were similar in design to those of German origin. As engine conditions became more onerous on the magneto, however, it was found that it would be necessary to design an entirely new magneto, and this work was undertaken on behalf of the Government during 1916, the type A.V. magneto being produced, on the inductor principle. The B.T.H. type A.V. magneto was first built for 8 and 12 cylinder engines, and was found to give very much more satisfactory results than could be obtained with the previous models. Magnetos of this type were extensively used during the latter part of the War, and not only were they the first 12-cylinder magnetos manufactured in this country, but the British Thomson-Houston Co. was the only firm who supplied 12-cylinder magnetos during the War. About 50,000 magnetos were supplied by this firm for aircraft purposes during the War, and the A.V. magneto is extensively used today for aircraft engines of 8, 12 and 14 cylinders. The magneto is provided with a stationary armature and a rotating polar inductor; the current generated reaching a maximum value four times during each complete revolution of the polar inductor, and thus producing four sparks per revolution of the armature shaft. The rotating inductor shaft is of the "straight through" type, which forms an excellent mechanical construction specially adapted to withstand the severe vibrations which are encountered in service on aeroplane engines. Safety spark-gap electrodes are mounted on the half-speed wheel of the magneto, and thus, when the machine is in operation, these electrodes are constantly sweeping through the air, and ionisation is entirely avoided. B.T.H. magnetos were the first to embody the "jump-spark" distributor, a feature which eliminates the use of a carbon distributor brush.

A nine-cylinder magneto, type A.O. 9, was designed by this Company during the early part of 1918, for nine-cylinder radial engines, which were being built at that time, and this magneto is standard today for all 9-cylinder engines. The excellence of B.T.H. magnetos is continually being demonstrated by the record which they help to achieve, and, to quote one illustration of this fact alone, these magnetos have been used by all machines which have won first and second places in the Aerial Derby for four consecutive years.

#### British Petroleum Co., Ltd.,

22, Fenchurch Street, London, E.C. 3.

THIS firm's contribution to the aviation industry is "B.P." aviation spirit, and also underground systems of storage for same. One of these storage plants has been installed at the Croydon Aerodrome.

#### The British Oxygen Co., Ltd.,

Angel Road, London, N. 18.

WITH the growth of the all-metal machine, welding will become a more and more important item in aircraft construction. For welding work oxygen is employed very largely, and the above firm supply oxygen in large quantities, promptly, for this purpose. They have oxygen works distributed over various parts of the country, which greatly facilitate the delivery to all localities.

#### Brown Bros., Ltd.,

Great Eastern Street, London, E.C. 2.

THE special Aircraft Fittings and Materials Department of Brown Bros., Ltd., established about ten years ago, now occupies an unique position in the industry. This house is one of the largest, if not the largest, supplier of aircraft parts to practically all British manufacturers, in addition to exporting a considerable amount of material to foreign Governments and aircraft manufacturers. A very good opinion can be formed of the extensive range of material handled by a perusal of their comprehensive 96-page quarto catalogue which, in addition to covering aircraft fittings and materials, instruments, tools and aerodrome

presswork and built-up metal fittings, also to make to order machine parts in special steel, and they possess facilities for handling throughout export orders of any magnitude with despatch.

#### Brunton's,

Musselburgh, Scotland.

BRUNTON'S are an old-established firm having a world-wide reputation for wire and wire ropes for all classes of work. They were one of the first to specialise in the aviation side of their business, and as early as 1907 supplied steel tie-rods to the British Government for use in the construction of airships and aeroplanes. Their special knowledge of the details of aircraft rigging has placed them in a position to provide many details used in that branch of aircraft construction, and has enabled them to introduce several designs of their own, which have been approved of and used by the British Government. Everything in the nature of wires, cables, or appertaining to the bracing of aircraft, may be obtained from Brunton's.

#### Bullivant and Co., Ltd.,

72, Mark Lane, London, E.C. 3.

BULLIVANT'S are specialists in stranded steel wires and cables, and are pioneers in this work in connection with aviation. They have done a considerable amount of research work with a view to producing stranded cables to meet the various requirements for aircraft, and in 1908 they drew up specifications which included some 96 different constructions of strand and cord for use with aircraft. Further experiment and experience ultimately resulted in the first Aircraft Cable Schedule ever issued being compiled in 1912. This schedule was subsequently adopted *en bloc* by the then Royal Aircraft Factory. During the War this firm did valuable service in the production and improvement of cables for aircraft, and were responsible for solving one or two difficult problems that arose. Further experiments are now being carried out with flat cords—as distinct from round—and they have patented a new design. They will be pleased to give further information in this connection to those interested.

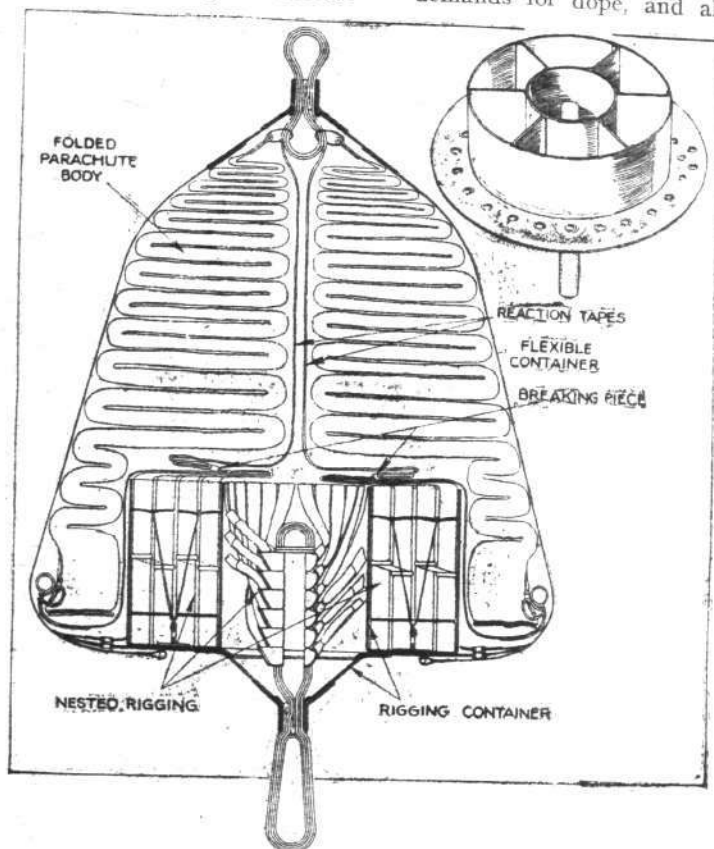


**E. R. Calthrop's Aerial Patents, Ltd.**

423A, Edgware Road, London, W. 2.

THERE is very little one can say here as regards this firm other than the fact that the "Guardian Angel" parachute is undoubtedly an exceed-

found sufficient, and by means of certain additions to it and arranging night and day shifts, the amount of Cellon required by this country and the Allies was forthcoming. It was, however, necessary to continually increase plant in order to meet the ever-growing demands for dope, and also for the



The Calthrop Type H "Guardian Angel" Parachute.

ingly well-designed and thoroughly thought-out proposition, and that it has demonstrated by innumerable "flights," that it is as reliable an apparatus as it is humanly possible to obtain. Mr. Calthrop has been at work—and worked hard—on the development of the parachute for a good many years now, and it should not be long now before the aviation world will wake up to the fact that there is in the "Guardian Angel" a very important and useful "accessory" for aircraft.

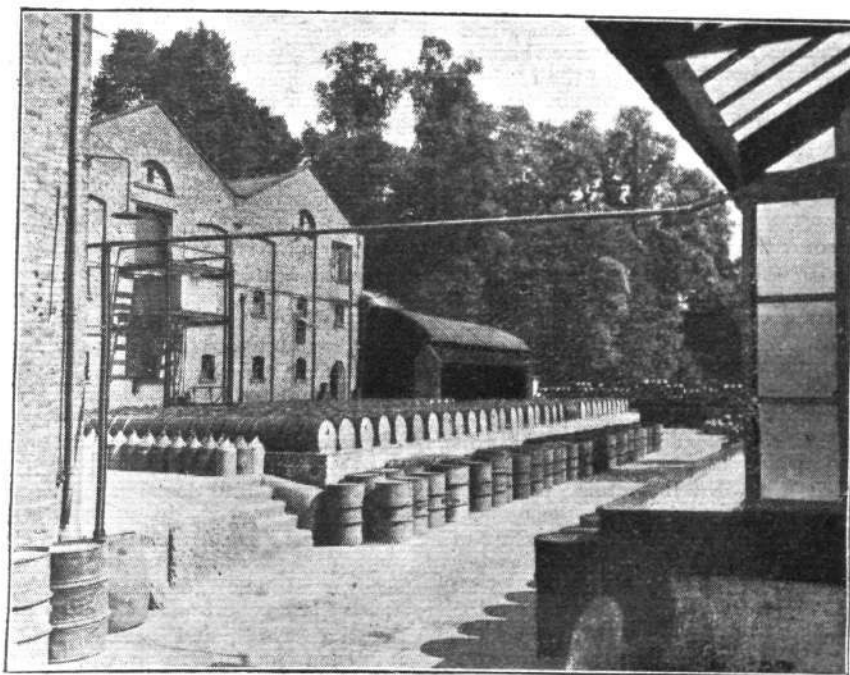
**Cellon (Richmond), Ltd.,**

22, Cork Street, London, W. 1.

THE first Cellon dope manufactured in this country was made in a small works at Clapham, the manufacture of the material starting at the beginning of 1911. Although at that time there was not a large demand for dope, the requirements soon outgrew the facilities available at Clapham, and in the following year arrangements were made with Messrs. Thomas Tyrer and Co., chemical manufacturers, at Stratford, to manufacture the dope on behalf of the Cellon Company. In the year 1912 every important competition held in this country was won by machines doped with "Cellon," and large orders were executed for the War Office and the Admiralty. At the end of 1913 the concern was turned to a Limited Company under the name of Cellon, Ltd., but Messrs. Tyrer still continued to manufacture for the new company. During the early part of the War, the plant at Stratford was

newly introduced dope coverings. In 1916 it was realised that it was impossible to further increase the output of

etc., etc., and are generally acknowledged to be the most complete of their kind in this or any other of the Allied countries, and many foreign Commissions visited them during the War. Some of these Commissions, too, asked for and were allowed access to plans of the works, afterwards erecting plant on similar lines in their own countries. In 1918, Cellon (Richmond), Ltd., the present company, was formed to take over the works. Naturally, the termination of hostilities considerably reduced the quantity of dope required in this country, but, on the other hand, the export of dope was again permitted, and there was an immediate demand from the principal foreign Governments for Cellon materials. This demand has grown considerably, and still continues. With the slackening demand for dope, the Research Department of the works were able to devote more time for experiments on other uses and properties of cellulose solutions, with a result that a number of these have been introduced, and are at present being manufactured in large quantities. The chief amongst these are the "Cerric" black lacquers, which are made in all grades to give from a dead matt to a highly glossy finish. These, like all the "Cerric" materials, are rapidly applied by means of spray, and dry very rapidly. They are now being used in a large number of works to replace stoving enamel. Other "Cerric" materials include transparent lacquers, wood solutions, coloured solutions for decorating tins, boxes, furniture, etc., and bronzing medium. Another speciality of the firm is "Porcelac" white solution, which is used very largely for the covering of bathroom and hospital fittings, bath taps, etc. Although considerable experiments have been carried out on the "Cerric" materials, experimental work on dopes has not



A part of the Stores Section of the Cellon Works at Richmond.

dopes and dope coverings, with the result that extensive works were taken at Richmond, Surrey. The works themselves comprise large mixing rooms, storage houses, laboratories,

been overlooked, and Cellon Scheme "B" pigmented dope is claimed to be the most economical and efficient scheme of doping obtainable. Continual improvements have been made

in this scheme, particularly in regard to providing materials which can be applied either by brush or by spray, and now that so many aircraft works have spray plants installed, this latter point is of particular importance.

**R. W. Coan,**

219, Goswell Road, London, E.C. 1.  
WHERE lightness is of such importance as it is in aircraft construction aluminium naturally plays a prominent part in many ways, not only in the engine, but with various fittings, etc. The name of Robert Coan is too well known in connection with all kinds of aluminium castings to need anything further being said than that Coan's castings are notable for their cleanliness and accuracy, and that the aviation side of this class of work is well catered for.

**The Falcon Airscrew Co.,**

113, Cottenham Road, London, N. 19.

THIS firm has a well-equipped factory, and a staff of highly-skilled workmen, for the production of airscrews of all types. These are built up from the best selected wood, and the finish given to each "prop." leaves little to be desired. Three-bladed airscrews—a difficult proposition—form a speciality, whilst they have recently brought out a new scheme for metal-tipping the blades of airscrews, by means of a series of independent metal "clips" placed one next to the other along the edge of the blade. This system is claimed to be a considerable improvement on the single metal strip method.

**Fox Bros. and Co., Ltd.,**

Wellington, Somerset.  
THE above firm is one of the oldest woollen manufacturers in this country, and are the originators of the "Puttee." "F.I.P." (Fox's Improved Puttees) are well known in the Royal Air Force, to pilots, sportsmen and many others. It is not only the high quality of the material with which these Puttees are made that makes them famous, but the manner in which they are shaped, etc. It is something more than "just a strip of cloth wrapped round and round the leg."

**The Hoyt Metal Co. of Great Britain, Ltd.,**

Deodar Road, Putney, London, S.W. 15.

AMONG the main factors which have contributed to the success of the Hoyt Metal Co., manufacturers of anti-friction (Babbitt) metals, are their earnest endeavours not merely to meet all existing requirements, but to keep a little in advance of the immediate needs of designers and users of all classes of machinery, and thus, so far as is possible as manufacturers of lining metals, to assist in the development of mechanical construction. An important result of this policy is found in their Number Eleven Alloy, a metal familiar to all engineers interested in the construction and maintenance of aviation engines. When those entrusted with the development of the Allied Air Services were testing and selecting materials for this important work, Hoyt Number Eleven was found to be incomparably superior both intrinsically and mechanically to anything else, and was the bearing metal adopted. During 1918 alone orders for some 1,750 tons were placed

by the Allied Air Departments. Over 380 tons were used for the bearings of 49,893 Hispano-Suiza aviation engines. The distinctive features of Hoyt Number Eleven are its exceptional toughness and unequalled durability. The former characteristic is important, rendering it much less liable than any other babbitt to crack up and break away. The tin component is over 92 per cent. The company maintain a department designed to assist and advise, gratuitously, on all matters relative to bearings, white-metalling and lubrication. Enquiries from France are invited by Société Française du Métal Antifriction "Hoyt," 44, Rue de Prony, Paris (xvii).

**Lang Propeller, Ltd.,**

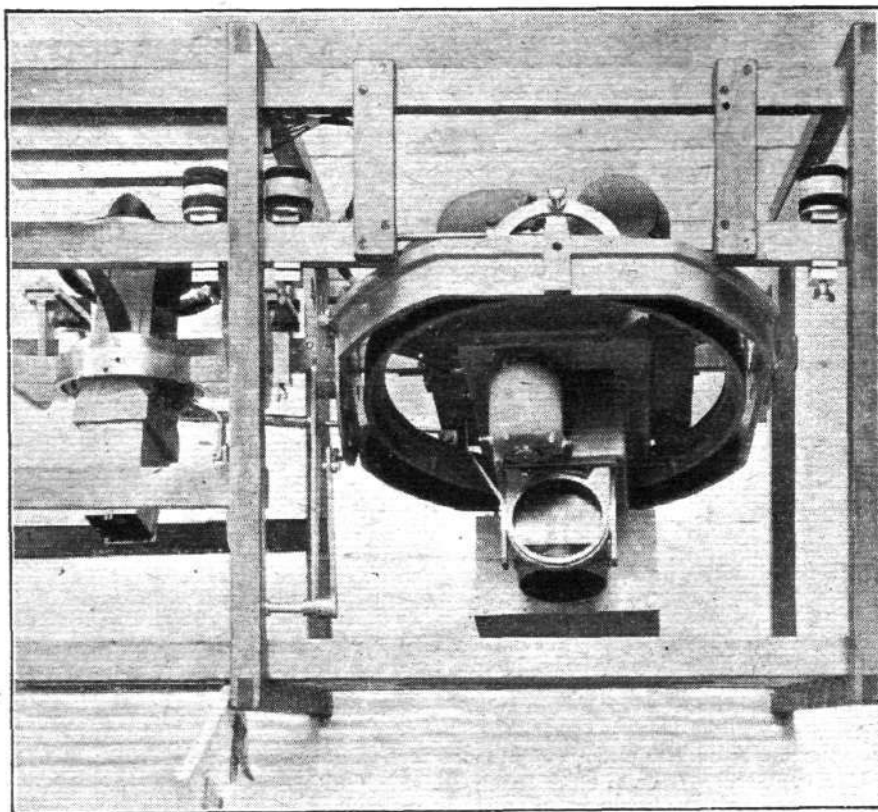
Weybridge, Surrey.

THE design and manufacture of airscrews for all types of aeroplanes and seaplanes is undertaken by this firm. Unfortunately, at the time of writing, we have not received any particulars as to any special work now carried out by this firm.

**Marconi's Wireless Telegraph Co., Ltd.,**

Marconi House, Strand, W.C. 2.

THE activities of the Marconi Co. in connection with aircraft wireless date back to pre-war days. Early experiments in the transmitting of messages by wireless from aircraft to the ground were conducted at Brooklands in 1913.



A New Kodak Automatic Aero Camera, suitable for survey work.

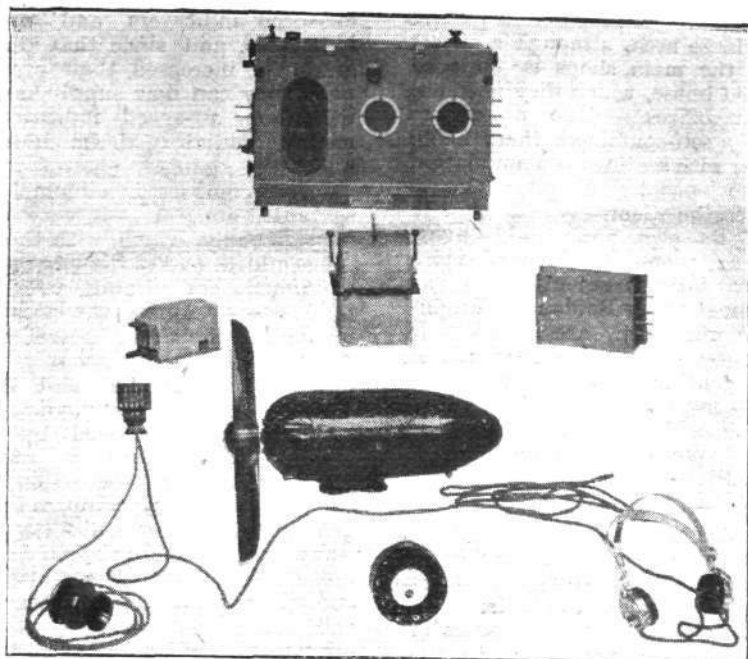
**Kodak, Ltd.,**

Kingsway, London, W.C. 2.

THE aviation section of this famous photographic firm has developed to quite an important one. During the war this firm carried out a considerable amount of research work in connection with aerial photography, as a result of which they have now several efficient aero cameras suitable for various purposes. We illustrate herewith one of their latest models, an automatic camera suitable for survey work. It is not possible to describe this camera here—we hope to do so in a future issue—but may mention that it embodies all the features of the well-known Kodak Topographic camera as regards automatic film wind, shutter wind, and release, and in addition includes a mechanism for the photographic recording on each negative of the time, altitude and inclination of the camera when the photograph was taken, and serial number of the negative. A special mount is provided enabling the inclination of the camera to be controlled very exactly.

During the war much progress was made and larger quantities of apparatus manufactured at the company's works. After the Armistice an aircraft department was formed, and a special staff (who had had much experience of aircraft wireless during the war) was organised to handle the development of this important branch of the company's business. One of the greatest achievements in the development of aircraft wireless was the evolution of wireless telephony as a practical means of communication between one aeroplane and another, and those on the ground. This system was originally evolved for war purposes, but its great value for commercial flying being realised by the Marconi Co., a great amount of experimental work was undertaken in order to produce an efficient and reliable wireless telephone set, specially designed for use in commercial aircraft.

Another important aspect in connection with aircraft wireless is direction finding, and in this case the Marconi Co. has adapted the valuable Bellini Tosi system for use on aircraft flying



**Marconi's Aircraft Wireless Telephone, Type AD2.** This set weighs only 60 lbs., yet has a telephone range under normal conditions of about 150 miles.

over long distances on land and water, where this means of navigation is a very valuable aid. During the early stages of the growth of civil aviation in 1919 and 1920 much development work and extended demonstrations were undertaken by the company on the machines of both Messrs. Handley Page Transport, Ltd., and Messrs. The Aircraft Transport and Travel, Ltd., these being equipped and maintained by specialised engineers whose duty it was to study the conditions of working and behaviour of the apparatus with which these aircraft were equipped. At the present day all British aircraft flying regularly on inland and Continental air routes are equipped with this company's standard aircraft wireless telephone apparatus, and maintained by the special service organisation at Croydon Aerodrome. At this aerodrome also exists an organisation for development which has been specially created to study the results obtained, and to indicate what improvements from time to time may be effected, thereby making for continual progress. In addition to aircraft apparatus this company also makes a speciality of aerodrome stations, and has installed for the Air Ministry the present station existing at Croydon Aerodrome. This station has a power of  $1\frac{1}{2}$  kilowatts, and is equipped with directional reception and facilities for connecting through the wireless telephone to the land line system. Stations similar in many respects to this one have been supplied to several of the Continental aerodromes. In addition to its activities in the development of wireless for commercial aviation, the Marconi Co. specialises in equipments for Service requirements to meet the needs of the British and foreign Governments.

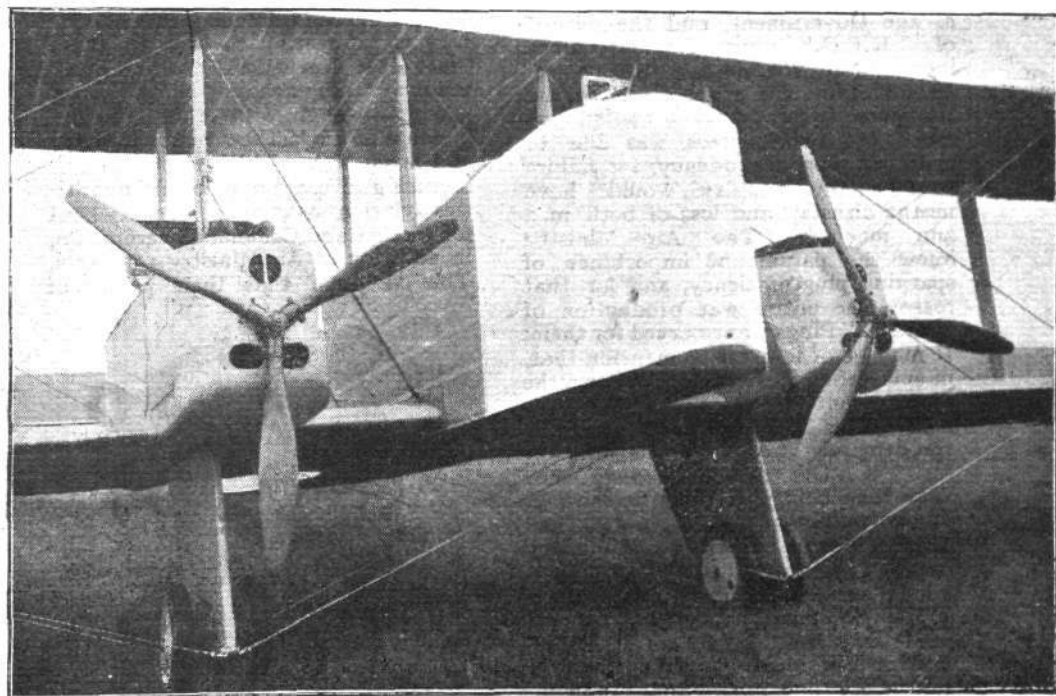
**J. MacLennan and Co.,**

115, Newgate Street, E.C. 1.

FABRICS, yarns, insulating materials, tapes and webbing, as required in the construction of aircraft, are the specialities of this well-known firm.

**The Metal Airscrew Co., Ltd.,**  
Regent House, Kingsway, London, W.C. 2.

AFTER an arduous period of research, experiment and close investigation, the metal airscrew has now "arrived" as a commercial proposition. The prediction of the *French Bulletin de Renseignements* of the Service Technique de l'Aéronautique made in



**A pair of Leitner Watts 3-bladed metal airscrews, fitted to a Farman Goliath.**

March, 1921, that the metal airscrew, by the tests made on the experimental ones produced by the Metal Airscrew Co. (associated in this country with the names of Mr. Leitner and Dr. Watts), "marks a great stage in the development of aviation," is thus being fulfilled. It now only remains for the Metal Airscrew Co. in this country to

establish its series of dies and press tools for various standards and for its allied firm in France, Etablissements Lumière under M. de Monge to do likewise, for metal airscrews to be as obviously and universally a component of aircraft as metal marine screws are for ships. At the Paris Exhibition we hope to find them not only in evidence on the stand of Etablissements Lumière, with the two propellers that established the Duration Record, but also on several of the leading French aircraft, such as the Farman-Goliath air liners; Breguet, Nieuport and Schneider (Creusot), and it will be gratifying that some of these will be of British manufacture as well as, of course, of French. Substantial orders for these metal airscrews have, we understand, been placed by the British and French Air Ministries, and it is noteworthy that this new—and we hope world—industry is due to British brains and enterprise.

**Naylor Bros. (London), Ltd.,**  
Slough.

have been established since 1800, and for many years their reputation has stood very high as makers of decorators' and painters' materials, and also for motor and coachbuilders' finishes. When aircraft came into being, therefore, this firm were able to utilise their large store of experience for the benefit of the aircraft manufacturer; helping him to obtain the very best finishes for his particular purpose. During the war the firm were, of course, engaged almost entirely on Government work, and besides supplying

large quantities of material for the R.A.F., they have also carried out much work in conjunction with, and for, the Royal Aircraft Establishment. Since the war the output of aircraft finishes has, of course, fallen off considerably, but Messrs. Naylor have supplied materials to many of our leading firms for their aircraft.

## Palmer Tyres, Ltd.,

Shaftesbury Avenue, W.C. 2.

ALTHOUGH the aggregate time that an aeroplane functions on the ground forms, or should do, but a small proportion of its daily routine, the conditions that have to be met during that time call for none the less arduous requirements. It is only to be expected, therefore, that a firm of such repute in connection with motor-car tyres as the House of Palmer should also be to the fore where tyres for aircraft are concerned. Their wide experience in tyre construction, together with a thorough examination into the problems arising in connection with aircraft, has enabled them to produce special aero tyres of all sizes to meet all requirements, and what is more, tyres that have achieved a world-wide reputation, and have contributed their full share towards many aviation successes. It should be pointed out that the Palmer Tyre Co. have not confined their activities to the tyre alone, but to the wheel as a whole—rims, spokes, hubs, etc., as well.

## The Robinhood Engineering Works, Ltd.,

Putney Vale, London, S.W. 15.

IT is, we believe, safe to say that no single firm has been more intimately connected with the history of British aviation than the Robinhood Engineering Works, Ltd. For "K.L.G." sparking plugs for aeroplane engines originated in the days when flying was still an experimental science, and were then recognised as the only plugs for aeroplane and super-efficient racing engines. Then came the war, and for four and a-half years the entire resources of the Robinhood Engineering Works, Ltd., were at the disposal of the Government, and the output of "K.L.G." plugs for aeroplanes increased in volume and importance. In reviewing the great deeds of the Air Force it is as well to realise that much of their success was due to sparking plug dependency, for failure over enemy country would have meant disaster, and loss of both men and machines. The Air Ministry knew the paramount importance of sparking plug efficiency, and for that reason the entire war production of "K.L.G." Plugs was reserved for them. It may be of interest to mention that, in spite of concentrated effort and the employment of over 1,000 hands, the firm never succeeded in satisfying the demands of even the Air Ministry for "K.L.G." plugs, although they were then being produced at the rate of two million plugs per year. Their unquestionable supremacy at the conclusion of hostilities has remained unchallenged until today, and "K.L.G." sparking plugs are still used as standard fitment by every British aviation engine manufacturer. For every one of the epoch-making flights of 1919-20 "K.L.G." plugs were chosen, not only for use in the actual machine which was the successful participant, but also by every British entrant. In fact, it is no exaggeration to say that every British achievement in the air since the War has been accomplished with their help. The makers of "K.L.G." plugs have their splendidly equipped works at Putney Vale, in South West London, on the main Portsmouth road. The outside appearance of the works is

very deceptive, as they actually cover quite a large area, although a direct view of the main shops is impeded by the old house, which they now use for their offices. The works are absolutely self-contained, there being a canteen with seating accommodation for 1,000 people, a power house by which the Company will shortly generate its own power and light, ambulance rooms, and even more land for future extension. The management of the Robinhood Engineering Works, Ltd., are nothing if not progressive, and experimental work is continually taking place, so that as aeroplane engine design improves so will the development of "K.L.G." plugs keep pace with it until finality is reached.

## Rubery, Owen and Co.,

Darlaston, Staffs.

IN addition to a full range of standard aeroplane fittings, such as A.G.S. turn-buckles, eye-bolts, bolts and nuts, etc., this firm specialises in pressed steelwork as applied to aircraft construction—all-steel spars, ribs, struts, etc. They also have several fittings of their own design possessing certain noteworthy features.

## Shell-Mex, Ltd.,

Shell Corner, Kingsway, London, W.C. 2.

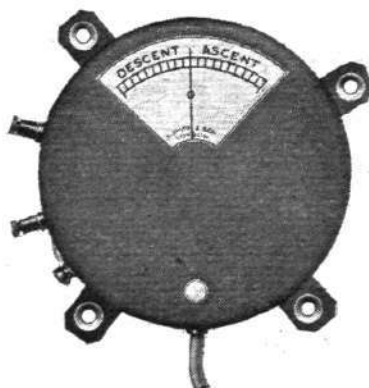
THE excellent qualities of the various "Shell" brands of petrol could not be demonstrated better than by the list of the aviation records and successes in which "Shell" has played a part. It is to be regretted, however, the space will not permit us giving such a list—especially as it includes nearly all of them!

## S. Smith and Sons (M.A.), Ltd.,

Cricklewood, London, N.W. 2.

IT is interesting to hear in these times of a firm who is really making headway in the aviation world. After passing through, with others, the depression of the last few years, S. Smith and Sons (M.A.), Ltd., are now manufacturing in quite appreciable quantities aviation instruments of every kind for foreign and Colonial Governments, in addition to Air Ministry contracts. This is proof that their policy of

air-speed indicators and revolution indicators, and since that time have gradually increased their programme until they can now supply revolution indicators, air-speed indicators, altimeters, radiator thermometers, oil and fuel gauges, petrol contents gauges, compasses, clinometers, air sextants, etc., etc.—a very comprehensive range which, with the K.L.G. plugs added, makes the most complete equipment for aircraft ever offered by one firm. Among the latest instruments are the Smith petrol contents gauge, which has been previously described in FLIGHT, and the new Campbell Bennett aperiodic compass, which is manufactured by Messrs. Henry Hughes and Son, for whom Smith's are the sole selling agents for the world. This compass is rapidly gaining favour, and will fill a long-felt want. In addition to ordinary standard instruments, Smith's can also supply special apparatus for testing and calibrating instruments, including altimeter testing apparatus with vacuum pump and bell jar, special gauges for bench test, etc., etc. The record of past successes reveals the fact that when any important flight or competition takes place in any part of the world Smith's instruments have always been fitted to the successful machine. The first instance was on the late Sir John Alcock's flight across the Atlantic, and the late Sir Ross Smith's flight to Australia—in each case the machines were fully equipped with instruments of Smith manufacture. In the Aerial Derby for the last three years every machine has carried Smith's instruments, and the Daimler hire liner G-EBBS, built by the De Havilland Aircraft Co., which up to October 7 last had travelled over 79,000 miles, was also fully equipped with Smith's instruments; sufficient testimony, therefore, of the fact that aircraft manufacturers cannot do better than go to Smith's always for their instruments and accessory requirements.



Two "Smith" Aero Instruments. On the left the inclinometer and on the right an air-speed indicator.

maintaining at whatever cost an experimental department continually at work on perfecting the Smith aviation instruments has proved of value to them in the long run, as they are now in a position to supply, not one or two, but every type of instrument for both experimental and general purposes. During the war they made not less than a quarter of a million

## Titanine, Ltd.,

175, Piccadilly, London, W. 1.

THE growth of Titanine, Ltd. (in its early days the British Aeroplane Varnish Co.), is by way of being a business romance. Titanine Dope came to life at the commencement of the Great War. At this time the presence of tetrachlorethane in the "dopes" then used was taking an

alarmingly increasing toll of the workers' lives. The Titanine firm developed their dope along the lines of elimination of the deleterious ingredients, and produced the original non-poisonous dope with such satisfactory results that the British Government later prohibited the use of tetrachlorethane. The troubles of Messrs. Titanine were, however, by no means at an end; the, at that time, experts had an unswerving predilection for dopes of acetyl cellulose base. (Titanine having nitro cellulose as its basic ingredient.) Irrefutable proof, however, was tabled that titanine possessed four of the fundamental qualities of a dope in a markedly higher degree than other dopes, these qualities being adhesion, flexibility, durability and constancy of tautness under varying atmospheric conditions. Also, titanine was so manufactured that it withstood flame to a greater extent than other dopes. This was the result of a discovery of firms' chemists. The claim of durability was amply justified by the fact that practically the whole of the "Avro" machines, used so often and extensively for training work, were

the fact that the "Bamel" or "Mars I," the Gloucestershire Aircraft Co.'s record-breaking machine, was coated with the titanine special racing scheme for the Aerial Derbies of 1921 and 1922 and for its great flight at Martlesham early this year. The foreign trade of Titanine, Ltd., has also grown apace, several large foreign Governments now use titanine doping schemes for military and naval aeroplanes almost exclusively; also many of the largest hire and passenger carrying firms are doing likewise. Messrs. Titanine inform us that their affiliated company in the U.S.A., known as Titanine Inc., whose works are in New Jersey, are also fully occupied, several large Government orders having been received by them.

#### Vickers, Ltd.,

Vickers House, Westminster, London, S.W. 1.

THE aviatric energies of this go-ahead firm are not confined to the design and construction of aircraft alone, but includes their accessories and components as well. First, there is the raw material for aircraft in the form of special steels and the famous "Duralumin." Then, as regards the

airships and balloons, are manufactured by this firm. It may be of interest to note that they were the makers of the material for the first kite balloon sent to France at the commencement of the war.

#### T. Wheeler,

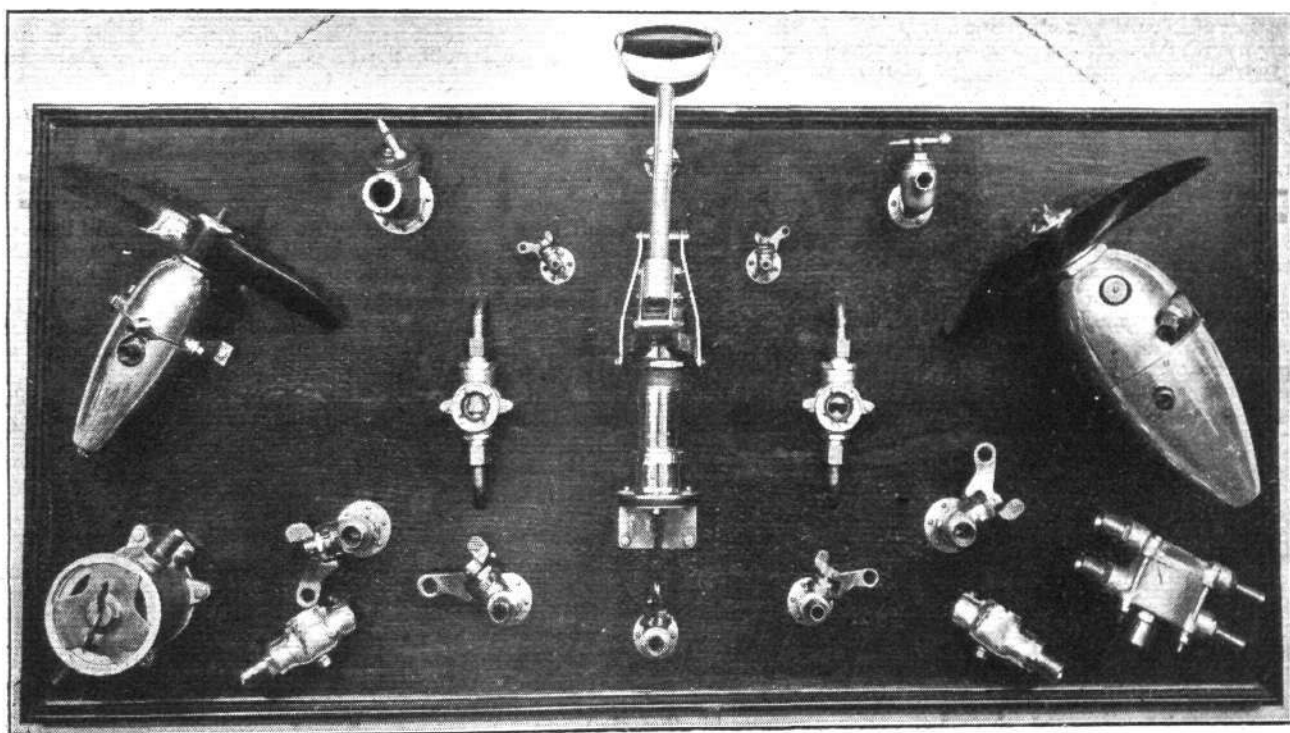
217, Goswell Road, London, E.C. 1.

THE firm of T. Wheeler is an old-established one manufacturing aneroid barometers, and scientific instruments. They have recently put on the market a new altimeter having an anti-lag device, which makes a very important improvement in altimeters as used for aircraft. This anti-lag altimeter should be of considerable value for long distance and night flying.

#### C. C. Wakefield and Co., Ltd.,

Cheapside, London, E.C. 2.

It is safe to say that with the history of British aviation no individual product has been so closely associated as Wakefield Castrol "R." For that world-famous aero-engine lubricant has played its own important part since the beginning of flying on practically every type of aeroplane, seaplane, flying boat and airship. Working as it often must under greatly varying pressures and tempera-



Some of the Vickers patent petrol accessories, fittings, etc., for aircraft.

doped with titanine. Adhesion is strongly characteristic of titanine, the tendency to crack and peel off so noticeable after a time with acetate dope being entirely absent. Approximately 1,000,000 gallons of titanine were manufactured during the Great War, the Company maintaining three large factories in this country in the North, Midlands and South, in order to expedite the distribution of the dopes and finishing materials. In addition, a factory was erected in New York to meet the increasing demand of our American allies. The post-War activities of this firm have not been without interest; they have continued their research, and have discovered a new type of titanine, of, we understand, even greater merit, but at the moment we are not permitted to give further details. An outstanding feature among their activities is

accessories, they have specialised in the improvement in the petrol system as a whole, and have produced fittings and components—pumps, relief and by-pass valves, cocks, etc.—for this important section of considerable efficiency. Other Vickers "accessories" include the Reid Control Indicator, which has been installed in many of the machines on the London-Continental Service, as well as being in use in Japan and other countries; and the Davis Navigation Lights for aircraft. These latter include a very comprehensive range of lamps—head, tail, port and starboard, etc.—suitable for equipping an aeroplane for night flying in as efficient a manner as possible.

#### The Victoria Rubber Co., Ltd., Edinburgh.

FABRICS for use in connection with aircraft, especially rubber-proofed for

tures, the aero-engine oil has to withstand the severest tests. Indeed, the whole problem of efficient lubrication is one of a highly complicated and technical nature. In this connection Wakefields were able to draw upon their great experience already gained on high-powered racing motor-cars and motor-boats. So that with the data they had gathered they were able to set their research department, with its well-equipped laboratories, to a task which was not so much a new problem as a development; and, of course, the firm enjoyed the active co-operation of engine builders in the form of practical experiments and tests—on the bench and in the air. The outcome of this pioneer work was the production of Castrol "R," the fame of which has extended throughout the entire world of flying. The feature of this lubricant is that

it is an absolute blend (not merely a mixture of ingredients), the constituents of which do not separate however long they are allowed to stand. Possessing all the lubricating properties of castor oil, and reducing to the minimum the tendency to

carbonisation, which is present in all vegetable oils, Castrol "R" has a higher "flash point" and a remarkably low "freezing point." The latter feature is, of course, of vital importance. Castor oil becomes too thick to lubricate at zero Fahrenheit,

but Castrol "R" retains its fluidity at a temperature of -26 degrees F., or 58 degrees of frost. This means that the engine continues to be lubricated at any altitude or in any temperature at which flying is practicable—at the time of writing, anyhow!

## THE BRITISH AIR-LINES

THE history of British civilian flying, as regards the running of regular services over specified routes, commenced in 1919, when the A.T.T. (Aircraft Transport and Travel) commenced operating a service between London and Paris, using converted war type of machines for their purpose. Partly owing to the uneconomical nature of the machines, and partly owing to the lack of any Government assistance, this firm had to cease operations, but not before a very great deal had been learned about the conditions to be met with in running such a service, and, incidentally, having proved the feasibility of keeping to a fixed time-table and flying with good regularity, coupled with safety to passengers.

Handley Page Transport, Ltd., also commenced operations in 1919 on the London-Paris route, while during 1919-20, a service was also run between London and Brussels and London and Amsterdam. It is worthy of mention that these services were run without Government assistance in competition with foreign subsidised services.

Last year three British firms were operating subsidised services on the London-Paris route, but this resulted in a great deal of undesirable competition between the British firms, and caused a certain amount of overlapping and duplication of ground organisation.

A few months ago it was decided to allocate to each of the three British operational companies a separate and distinct route, and the present arrangements are that Handley Page Transport, Ltd., operate the London-Paris service; the Instone Air Line, Ltd., have had allocated to them the London-Brussels-Cologne route, and the Daimler Airway are breaking new ground with a service between Manchester and London, and London-Amsterdam, the latter to be extended to Berlin as soon as the necessary arrangements can be made.

### The Daimler Airway

The moving spirit of the Daimler Airway is Colonel Frank Searle, who was associated with Aircraft Transport and Travel in its pioneer services between London and Paris. Col. Searle is ably assisted by Major Woods Humphrey, who had previous experience of air lines with Handley Page, Ltd.

The Daimler Airway is a branch of Daimler Hire, Ltd., and the machines used are D.H.34's, with Napier "Lion" engines. These machines have seating accommodation for ten passengers, and have proved economical to run, considering their high performance. A daily service in each direction is maintained between London and Manchester on the one hand and London (Croydon) and Amsterdam on the other.

### Handley Page Transport, Ltd.

With the exception of a short interruption in 1921, due to the impossibility of running unsubsidised services in competition with French subsidised ones, Handley Page Transport, Ltd., have operated the London-Paris service since 1919. The Manager of the firm is Mr. E. Cogni, and the machines used are Handley Page W.8B's with two Rolls-Royce "Eagle" engines. This type has been chosen because the firm is of the opinion that a twin-engined machine reduces to a minimum the risk of forced landings on unsuitable ground, the one engine being sufficient to enable the machine to reach a good landing ground, even if not able to reach its destination. As a matter of fact, unless the machine carries full load, it should be able to complete its journey on one engine. The seating accommodation of the H.P. W.8B is for 12 passengers, but next year the W.8c will be put on the service. This machine will have seating accommodation for 16 passengers.

### Instone Air Line, Ltd.

Messrs. S. Instone and Co., Ltd., bought a D.H.4A early in 1918 for the purpose of rapid communication between their various offices in England and on the Continent. This marked the beginning of this firm's interest in aviation, and a number of different machines were gradually acquired, and used on the London-Paris service. In April, 1922, the firm was made into a limited company under the title Instone Air Line, of which Sir Samuel Instone is chairman, and this line is now operating a daily service (in each direction) between London-Brussels-Cologne. Several types of machines are used, such as the D.H.34, with Napier "Lion" engine, the Vickers Vimy-Commercial, with two Rolls-Royce engines, and the Vickers Vulcan eight-seater, with one Rolls-Royce "Eagle" engine.

## LONDON TERMINAL AERODROME

Monday evening, December 11, 1922

PASSENGER traffic has remained good in spite of the fact that the usual thick December weather has done its best to interfere with the running of the air services during the past week. Between 135 and 140 passengers have been carried by the six lines which run services from London, the most striking feature of these figures being the way in which the traffic on our new inland service is being maintained.

During the past week no fewer than 48 passengers have travelled on the Daimler Airway machines between Manchester London and Amsterdam, a bigger total than on any other route, and of these 38 were passengers between London and Manchester.

With the figures for passengers carried by the K.L.M. added, there was a total of 65 passengers—out of a grand total of 135 for all lines—on the Manchester-London-Amsterdam route.

The C.M.A. Air Lines are having great success with their early morning newspaper service from Lympne to Paris. During the past week the machines have flown every day in spite of the fact that the regular passenger services to Paris have been very erratic.

The new Handley Page torpedo-plane, which is to be at the Paris Aeronautical Exhibition this week, was to have flown over from Cricklewood to Croydon, and on to Paris, on Friday, but, owing to a thick smoke-mist which hung over Croydon, the machine was unable to land there. The sound of the Napier engine could be heard as the torpedo-plane circled round the aerodrome, and on one occasion the machine was sighted flying low over the sheds at a very slow speed, but the pilot was evidently unable to see down through the mist, and, after circling round for some time, he eventually alighted at Kenley, which was quite clear.

### A Question of Customs

In the morning a D.H.34, en route from Amsterdam, and piloted by Mr. Herne, was unable to find Croydon through the smoke-barrage and finally alighted at Stag Lane. He had one passenger on board, and, owing to delay on the part of the Customs' officials in that district, this passenger was kept waiting, with a policeman in close attendance, from 12.15 p.m. to 4.30 p.m. It is about time that better arrangements were made for dealing with passengers who, by reason of weather, are landed at some aerodrome other than Croydon. There are only about three places where alternative landings are made, and it is surely not impossible to arrange that someone who is always there could be invested with sufficient authority by the Customs to clear the few passengers so landed without all this delay.

Mr. Lloyd, the manager of the Trust House, has now arranged for luncheon-boxes for any passenger who feels that he or she would like to relieve the monotony of an air journey by taking a meal.

Mr. Lloyd tells me that great extensions to the Trust House are now contemplated. It is proposed to take over the old officers' mess at the entrance to the aerodrome, and equip this with a first-class lounge and dining-room, with the addition of a billiard-saloon and other luxurious arrangements. It is proposed, also, to build a false-front on to the building, and provide an open-verandah where teas will be served in summer; and I hear that it is further planned that a band shall be provided on Saturday and Sunday.

A party of booking-clerks from the provincial branches of Messrs. Thomas Cook and Son are having a "Cook's tour" of their own, and visited the aerodrome on Friday in order to see for themselves how air services are run, and thus be able to give enquirers for air travel a first-hand idea of how the comfort and convenience of passengers is catered for.

# THE ROYAL AIR FORCE

London Gazette, November 28, 1922

## Stores Branch

The follg. are granted short service commns. as Flying Offrs. for three years on active list, with seny. of dates indicated in brackets: (Oct. 1):—F. R. Berresford; April 1, 1918. J. C. Daniels; May 28, 1919. W. A. O. Honey; Dec. 23, 1919. A. J. Roberts; April 1, 1918. B. E. H. Wright is granted short service commn. as Flying Offr. on probn. for Accountant duties, with effect from, and seny. of, Nov. 15.

## Medical Branch

Sqdn. Leader J. F. Carruthers, M.D., relinquishes his temp. commn. on account of ill-health contracted in the Service; Nov. 29.

## Memoranda

Hon. Sec. Lieut. T. H. Davies relinquishes his hon. commn. on joining Army.

London Gazette, December 1, 1922

## General Duties Branch

The follg. Pilot Offrs. on probation are confirmed in rank (Nov. 1):—G. W. Dean, J. V. Holman, B. V. Reynolds, T. A. Verney-Cave. Observer Offr. A. W. C. Bayes is transfd. to Reserve, Class B; Dec. 1. Sqdn. Ldr. C. C. Miles, M.C., is placed on half-pay, Scale A; Nov. 10.

## Memorandum

Lieut. C. L. Munday, M.C., R. Fus., is granted rank of Maj., R.A.F., on retirement from Army; May 29.

London Gazette, December 5, 1922

His Royal Highness Edward Albert Christian George Andrew Patrick David, Prince of Wales and Duke of Cornwall, K.G., K.T., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O., G.B.E., M.C., is granted a commn. as a Group Captain.

## General Duties Branch

The following are granted permanent commns. in ranks stated, with effect from dates indicated. *Gazettes* of dates indicated in brackets, appointing these officers to short service commns., are cancelled:—*Flight Lieut.*—R. T.

Leather, A.F.C.; Aug. 8, 1921 (Aug. 16, 1921). *Flying Offrs.*—H. F. V. Battle, Sept. 16, 1919 (Sept. 16, 1919); K. L. Boswell, Sept. 14, 1920 (Oct. 1, 1920).

The following are granted short service commns. in ranks stated, with effect from, and with seny. of, dates indicated:—*Flying Offrs.*—G. C. Lugg; Nov. 27. W. D. Vernon-Knibbs; Nov. 22. *Pilot Offrs. on Probation.*—I. B. Gray, F. S. Henderson, R. G. Rickman, G. Terrell; Nov. 27.

Air Commodore C. L. Lambe, C.B., C.M.G., D.S.O., is restored to full pay from half-pay; Dec. 4.

The following are transferred to the Reserve:—

*Class A.—Flt. Lieut.*—W. R. S. Humphreys, A.F.C.; Dec. 5. *Flying Offrs.*—J. C. Bulteel, G. S. Coggan, C. B. M. Dale, G. C. W. Dufy, J. Edmunds, W. I. Hannon, R. Lamb, F. D. Travers, D.F.C.; Dec. 5. G. A. Gowler; Dec. 8.

*Class B.—Obr. Offrs.*—B. G. Drake, L. W. Kitt, M. J. Wyatt, M.C.; Dec. 5.

*Class C.—Flt. Lieuts.*—A. H. S. Baker, O.B.E., C. Musgrave, A.F.C.; Dec. 5. *Flying Offrs.*—P. Bailey, K. F. Jones, D. M. I. Macarthur, S. F. A. Welsh, G. W. Wilson, A.F.C.; Dec. 5.

*Flying Offr.* F. F. Tattam relinquishes his short service commn. on account of ill-health contracted on active service and is permitted to retain rank of Lieut; Dec. 6.

## Stores Branch

*Flying Offr.* (actg. Flt. Lieut.) C. C. J. Croydon is granted permanent commn. as Flt. Lieut. for accountant duties; Aug. 29. His name will be placed on the gradation list immediately below that of Flt. Lieut. W. H. Hoile, M.B.E.

## Chaplains' Branch

The Rev. J. H. P. Still, B.A., is granted permanent commn., with the relative rank of Sqdn. Ldr.; April 1, 1920. (*Gazette* of May 14, 1920, appointing him to a short service commn., is cancelled.) The Rev. J. F. Cox, M.C., B.A., is granted short service commn., with relative rank of Sqdn. Ldr.; Nov. 22.

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the Royal Air Force are notified:—

*Air Commodore:* C. L. Lambe, C.B., C.M.G., D.S.O., from half-pay list to Headquarters, Coastal Area (Supernumerary). 4.12.22.

*Wing Commander:* W. H. Primrose, D.F.C., from Headquarters, Iraq Command to command Armoured Car Wing Headquarters, Iraq Command. 3.11.22. J. C. Halahan, C.B.E., A.F.C., from R.A.F. School (India) to Headquarters, R.A.F. India (Supernumerary). 1.11.22. A. H. W. E. Wynn, O.B.E., from Air Ministry (Dept. of C.A.S.), (D.O.I.) to R.A.F. Depot (Inland Area). (Supernumerary). 1.12.22.

*Squadron Leaders:* A. G. R. Garrod, M.C., D.F.C., from School of Army Co-operation (Inland Area) to Air Ministry, Department of A.M.P. 4.12.22. R. P. Willock, from Headquarters, Iraq Command, to command No. 4 Armoured Car Company Iraq Command. 3.11.22. F. H. W. Guard, C.M.G., D.S.O., from Headquarters, Iraq Command to command No. 3 Armoured Car Company Iraq Command. 3.11.22. J. W. Cruikshank, O.B.E., from Headquarters, Iraq Command, to command No. 6 Armoured Car Company Iraq Command. 3.11.22. D. Harries, A.F.C., from Headquarters, Iraq Command, to command No. 5 Armoured Car Company Iraq Command. 3.11.22. G. S. M. Insall, V.C., M.C., from R.A.F. Depot (Inland Area) to Armament and Gunnery School (Inland Area). 8.12.22.

*Squadron Leaders:* C. C. Durston, from R.A.F. School (India) to Headquarters, R.A.F. India (Supernumerary). 1.11.22. A. G. R. Garrod, M.C., D.F.C. The notification which appeared in R.A.F. Bulletin No. 89, dated 28.11.22, where in this officer was posted from School of Army Co-operation to Air Ministry (Dept. of A.M.P.), with effect from 4.12.22, is hereby cancelled. I. T. Lloyd, from No. 2 Flying Training School (Inland Area) to command No. 56 Squadron (Inland Area). 25.11.22. Substituted for the notification which appeared in R.A.F. Bulletin No. 88, dated 21.11.22, wherein this officer was posted as stated above, with effect from 15.11.22. P. A. Shepherd, from No. 267 Squadron (Mediterranean) to Command R.A.F. Unit, H.M.S. "Ark Royal" (Mediterranean). 15.11.22.

*Flight Lieutenants:* J. Duminy, from R.A.F. Depot (Inland Area) to No. 2 Flying Training School (Inland Area). 1.12.22. J. W. Harper, M.D.,

from No. 14 Squadron Palestine Command) to Palestine General Hospital (Palestine Command). 27.10.22. M. Moore, from Headquarters, Constantinople Wing to Headquarters, R.A.F., Middle East. 31.10.22. R. P. M. Whitam, M.C., from Headquarters, Constantinople Wing, to Headquarters, R.A.F., Middle East. 31.10.22. M. J. James, M.B.E., from Headquarters, Constantinople Wing, to Egyptian Group Headquarters (Middle East). 31.10.22. O. Armer, from No. 2 Squadron (Detached Flight), (No. 12 Wing, Ireland) to M.T. Repair Depot (Inland Area). 30.11.22. H. G. Bowen, from Headquarters, Iraq Command, to No. 3 Armoured Car Company (Iraq Command). 3.11.22. G. F. P. Warren, from Headquarters, Iraq Command, to No. 4 Armoured Car Company (Iraq Command) for duty as Adjutant. 3.11.22. H. M. K. Brown, from Headquarters, Iraq Command, to No. 4 Armoured Car Company (Iraq Command). 3.11.22. D. O. Mulholland, A.F.C., from Headquarters, Iraq Command, to No. 5 Armoured Car Company (Iraq Command) for duty as Adjutant. 3.11.22. C. E. Wardle from Headquarters, Iraq Command, to No. 6 Armoured Car Company (Iraq Command). 3.11.22. H. A. J. Wilson, O.B.E., from Headquarters, Iraq Command, to No. 6 Armoured Car Company (Iraq Command) for duty as Adjutant. 3.11.22. H. V. Rowley, from Headquarters, Iraq Command, to No. 5 Armoured Car Company (Iraq Command). 3.11.22. F. Hudson, M.C., from No. 2 Squadron (Inland Area) to No. 2 Squadron (Detached Flight), (No. 12 Wing, Ireland). 1.12.22. H. E. P. Wigglesworth, D.S.C., from No. 2 Squadron (Detached Flight), (No. 12 Wing, Ireland), to No. 2 Squadron (Inland Area). 1.12.22. H. G. W. Lock, D.F.C., from R.A.F. Depot (Inland Area) to Inland Area Aircraft Depot (Inland Area). 1.12.22. P. H. Young, M.B., from No. 208 Squadron (Middle East) to C. and M. Party, Moascar (Middle East). 28.9.22. P. H. Young, M.B., from C. and M. Party, Moascar (Middle East) to No. 216 Squadron (Middle East). 31.10.22. F. H. Coleman from No. 2 Flying Training School (Inland Area) to Electrical and Wireless School (Inland Area). 8.12.22. J. H. O. Jones, from R.A.F. Base, Gosport (Coastal Area) to R.A.F. Base, Gosport (No. 210 Squadron), (Coastal Area). 21.11.22. M. Keegan, O.B.E., M.M., from Boys' Wing (Cranwell) to School of Technical Training (Men), (Inland Area), (Supernumerary). 1.12.22. Lieut.-Col. (Local Col.) H. G. Reid, C.M.G., C.B.E., D.S.O. (R.A.S.C.), to Command Headquarters, Palestine. 9.3.22.



**A NEW FOKKER AMPHIBIAN:** This machine, which has been built for the Dutch Navy, has just undergone its first test flights. The boat hull is built entirely of Duralumin. The engine is a Napier "Lion."

## IN PARLIAMENT

### Civil Aviation

REAR-ADMIRAL SUETER on December 5 asked the Secretary of State for Air whether he is aware that, as a result of money grants made by the French Government to French civil aviation companies, British newspapers and freight are carried by French aircraft between London and Paris at rates with which it is impossible for British aviation companies to compete; and whether some arrangements can be made to prevent this obvious undesirable state of affairs continuing and for traffic to be carried by British machines?

Sir S. Hoare: The answer to the first part of the question is in the affirmative. As regards the second part, the future policy in regard to civil aviation is now being considered, and I will bear in mind the suggestion of my hon. and gallant friend when reviewing the question of the future subsidies to be granted to the air transport lines.

Mr. Murchison asked the Secretary of State for Air whether the original air line subsidy, based on mileage and weight, was changed for a flat rate of £15,000 a year merely for 300 effective return flights, the majority of which may be run in the summer months alone; and, if so, why was this done?

Sir S. Hoare: The answer to the first part of the question, which I take to refer to the London-Paris route, is in the affirmative, but I would add that under the agreement a specified number of flights must be carried out during the winter months. With regard to the second part, the former subsidy arrangement proved to be unsatisfactory, the traffic available not being sufficient for the three British companies who were competing for it on this one route, and the whole scheme was therefore recast in order to make the best possible use of the money available.

Mr. Murchison asked the Secretary of State for Air whether the new subsidy given as a monopoly to Handley Page Transport, Limited, for the London-Paris air route provides for the early daily carrying of British newspapers as well as for passengers; and whether the transport of passengers cannot be remunerative without subsidy?

Sir S. Hoare: The answer to the first part of the question is that the new subsidy granted to the Handley Page Transport Company for the operation of the London-Paris route does not specifically differentiate between the carriage of passengers and goods, but leaves it open to the firm to carry that class of freight which they find most remunerative. The answer to the second part is that the transport of the comparatively small number of passengers at present travelling cannot be self-supporting without some form of direct financial assistance, but as the volume of traffic increases this position will improve and should ultimately right itself.

Mr. Murchison asked the Secretary of State for Air whether he is aware that the sale of British newspapers in France and Italy has been increased five-fold during recent months owing entirely to their early arrival by aeroplane in Paris and their distribution thence by early trains; and whether he is prepared to recommend giving a subsidy to air lines, which would be well supplied in thus fostering international understanding?

Sir S. Hoare: I fully appreciate the advantages of carrying British newspapers to the Continent by air, but while I recognise the importance of the early distribution abroad of these newspapers, I am not in a position to say whether it will be possible to find funds to provide a sufficient subsidy to enable these newspapers to be transported in British aircraft.

### London Air Stations

Mr. GILBERT on December 7 asked the Secretary of State for Air whether any further progress has been made as regards using the River Thames, near Westminster, for an air station; whether it is proposed now to have such a station on the River Thames; and, if not, is it proposed to establish an air station at any other place near the centre of London so as to save the delay in reaching the present station at Croydon?

Sir S. Hoare: The reply to the first and second parts of the question is in the negative, but any machine can alight on the Thames at Westminster provided that prior sanction is obtained. With regard to the third part, the possibility of establishing an air station closer to the centre of London than Croydon is being at present explored by the Civil Aviation Advisory Board.

### "Wakefield" Boxing Competitions

THE boxing competitions for the Wakefield Shields, competed for among members of the Royal Air Force, were concluded on December 6 at Henlow before a large number of spectators from virtually every Air Force station in the country. Results of finals:—*Officers*.—Light-heavy-weights: Fl./Officer A. E. M. Milne, Cranwell, beat Obs./Off. K. H. Holley, No. 1 Group, Kenley, on points. *Middles*: Pilot/Off. C. H. Ratcliffe, No. 1 Group, Kenley, knocked out Fl./Lieut. Nunn, No. 10 Group, Lee-on-the-Solent. *Light-weights*: Fly./Off. C. B. Bucknell, Cranwell, w.o. *Catch-weights*: Fl./Lieut. S. C. Simpson, Cranwell, beat Fl./Lieut. C. E. H. James, No. 7 Group, Andover, in second round. *Fly-weights*: Fly./Off. Smith, Halton, knocked out Fl./Lieut. Hindle-James, Cranwell, in third round. *Welters*: Fl./Lieut. Angel, Halton, beat P.O. Guest, Andover, on points. *Bantams*: F./O. H. A. C. Atkinson, No. 1 Group, Kenley, w.o. *Feather-weights*: Fl./Lieut. Smith, Halton, beat P./O. Horsfield, Andover, on points. *Other Ranks*.—*Fly-weights*: A. C. I. Millington, Halton, beat A. C. Fort, Henlow, on points. *Light-heavyweights*: A. C. II. Egginton, Halton, knocked out A. C. II. Prestney, Kenley, in second round. *Welters*: L. A. C. Franklin, No. 7 Group, Andover, knocked out A/c 2 Williams, Cranwell, in second round. *Middle-weights*: A/c 2 Ballantyne, No. 7 Group, Andover, knocked out L. A. C. Hedge, M.T. Repair Depot, Shrewsbury, in first round. *Bantams*: A/c 2 Bridges, No. 7 Group, Andover, beat A/c Davies, Halton, on points. *Feathers*: A/c Whittaker, Halton, beat A/c 2 Moses, No. 7 Group, Andover, on points. *Light-weights*: A/c 2 Wyatt, Cranwell, beat A/c 2 Tate, Halton, in an extra round. *Catch-weights*: A/c 2 Forrester, Halton, beat A/c 2 Lockett, No. 7 Group, Andover, on points. Cranwell won the Officers' Shield with a total of 20 points, and Andover the Other Ranks' Shield with 42½ points.

## SOCIETY OF MODEL AERONAUTICAL ENGINEERS (London Aero-Models Association)

THE Concert at Headquarters last Friday was a great success, the good programme provided by Mr. Louch being very much appreciated by the large number of members and friends present.

The following report has been received from the official reporter of the Paddington and District Aero Club (which is affiliated to the above): Messrs. Dixon, Evans, Green and Levy were present on Saturday afternoon on the Flying Ground, Sudbury, Mr. Green timing. Mr. Dixon's machine showed promise, and put up the best performance we have yet seen from him. Mr. Evans' new double-surfaced glider did well, but seemed heavily loaded for calm weather. His best times were 20½ secs. and 22½ secs. This machine would undoubtedly do much better in a 10 to 15-mile breeze. Mr. Levy accomplished some good flights of 32 and 38½ secs., and finished up with 48½ secs. (215 paces), thus establishing a record for the Paddington Club.

A large number of members made an attempt to improve the official Gliding Record on Parliament Hill on Sunday morning last. Unfortunately, the weather conditions were unfavourable for such an attempt. Some excellent gliding was done by the members, a new recruit of the Society, Mr. C. Bayard Turner, putting up some excellent performances with an enclosed fuselage model, with double-surfaced wings. Mr. Hatfull made great efforts with his enclosed fuselage model, also with double-surfaced wings, his best performance being 30½ secs. Messrs. Burchell, Davies, Evans, Levy, Rippon, Whelpton, and many others tried very hard to put up a new record, the best attempt being Mr. Burchell, who put up 44 secs.

Members will meet at the Windmill, Wimbledon Common, on Sunday morning next to attempt to improve the Model Aeroplane records for 1922. Judges will be on the ground at 11 a.m. punctual.

Friday next at Headquarters, Mr. W. E. Evans will give his lecture on "Some Points on Wood." All interested should be present.

A. E. JONES.  
Hon. Sec.

### Parliamentary Appointment

LIEUT.-COL. THE RIGHT HON. SIR SAMUEL HOARE, Bt., C.M.G., M.P., Secretary of State for Air, has appointed Maj. Viscount Sandon, M.P., as his Parliamentary Private Secretary.

### R.A.F. Club—Christmas Holidays

By direction of the Committee, the Club premises will be closed from midday, Sunday, December 24, until 8 a.m. on Tuesday, December 26, 1922, except in so far as affects sleeping accommodation and light breakfasts for resident Members.

### Fined for Low Flying

THE first case in Essex under the Air Navigation Act was heard at Epping Police Court last Monday, when Frank Neale was summoned for trick-flying over the town, and fined £1. It was stated that Neale looped and rolled so low that his biplane nearly crashed into the roof of a grocery store.

### A Separate Air Service for France

A BILL has passed the French Senate establishing the Military Air Service as a separate arm on the same footing as the artillery or cavalry.

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